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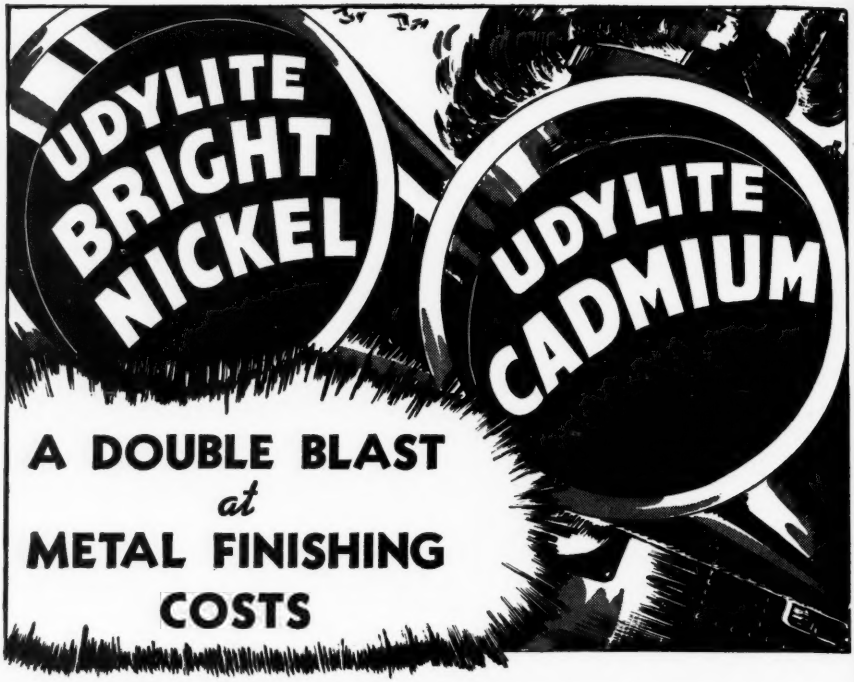

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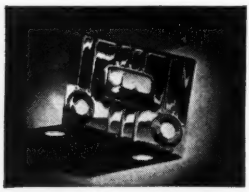

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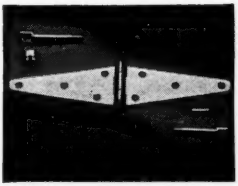

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CINCINNATI, OHIO VOL. 2, No. 8

MAY, 1938

Testing the Modern Finish

The Following Article Describes Tests for Abrasion Toughness, Adhesion-Flexibility, Hardness, Film Thickness, and Water and Moisture Resistance.

BY RAY C. MARTIN

THE determination of abrasive toughness resistance is of concern to those engaged in coating materials. The tests and devices in the following article for testing coating films are the only means which the author can recommend in which a definite value for the determination may be obtained. A material under test can always be compared with a master standard to determine the value.

The abrasive used in the abrasion toughness test is a substance used for wearing away a surface by friction. Some of the abrasives used for "wearing away" a coating material are pumice stone, rottenstone, charcoal, sand, sandpaper and steel wool. In laboratory testing, a mechanical device known as an abrasion tester can be used. This device is employed to determine the resistance of the finishing material to abrasion so that the life of the film, under conditions which surround its use, may be predetermined.

A practical abrasion machine for testing coatings is shown in Fig. 1. This machine is operated by a small motor and permits testing with an abrasive, grease, fats or similar lubricant. Coated panels after properly dried are inserted and properly fastened in place. The abrading material is fastened to the movable driving arm or in the event of a grease or lubricant is placed on a felt padding. The driving arm passes over the coated panel under test. A meter is provided to indicate the number of passes and when a rupture through the surface occurs, wherein a metallic contact is made, the machine stops. This abrasion test is considered of value in testing of coatings, especially as applied to the refrigerator industry.

Another form of abrasion test for metal finishes introduces a rubber eraser. This is an abrasive substance bound together with rubber. The eraser is passed over the finished surface having a rubbing action. The number of strokes required to rub through the finish in an indication of its wear resistance.

A sand abrasion testing device similar to the one shown in Fig. 2 is used for evaluating coatings. This is a closed container in which specimens for test are prepared on glass plates. Films of uniform thickness are applied and the film thickness is calibrated by means of a micrometer. Films are thoroughly dried (aged for 2 weeks at room temperature) and the test plate fitted into the container at a 45 deg. angle. Sand or carborundum is placed in an inverted container at the top while the glass slides remain stationary. The abrasive is released and drops by gravity through a standard orifice in a fine stream where it comes in contact with a blast of air. The air stream directs the abrasive against the test panel and the air pressure is closely controlled. A shielded light bulb may be placed back of the panel so that the film failure may be followed. When the film is worn through, the flow of abrasive is stopped. The rupture of the finish is easily discerned; the abrasive is weighed before testing and after rupture of the coating, the difference being the abrasive factor.

A modification of this device is made by Weber and Scher of Newark, N. J. The material under test is applied on 4 in. flat discs which are attached to a vertical shaft and rotated by motor control. The speed is regulated and the coated disc is rotated inside a vessel which is filled with sand to a level about 5 in. above the top of the disc. Micrometer readings of film thickness are taken before the test and after. The rotation of the disc in the sand wears off the finish and the sand is kept in continuous circulation by air. Wearing quality is expressed by a numerical scale (expressed in the loss of film material per 500-1000 revolutions, and so on), based on the number of thousands of revolutions to bring the wear line to the circle halfway between the center and the outer periphery of the disc. The center hole is concentric with the periphery and close fitting on the projecting end of the spindle.

Adhesion-Flexibility

The adhesion between solids and liquids (paint, varnish, lacquer or synthetic enamel coatings) refers to their wettability. Adhesion itself is the state of adhering or "sticking together" in contact. Paint and varnish materials hang together by adhesion but lacquer sticks to the work by cohesion. Both adhesion and flexibility are very important assets of coatings.

A bending test to determine ad-

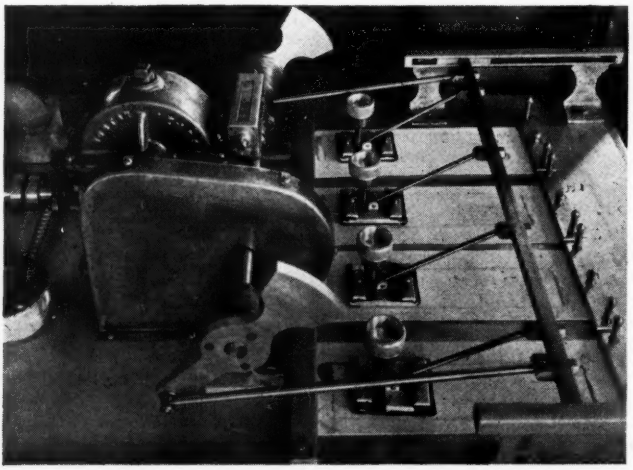

Fig. 1 — Illustration showing a practical abrasion testing machine for lacquer and enamel coatings.

hesion and flexibility over a ⅝ in. mandrel, or mandrel of varying diameter thickness, is sometimes used. The instrument requires a semicircular plate marked in degrees to determine any degree of bend. This measure of flexibility, of course, has a bearing on potential durability of coatings.

An Impact Testing Device which indicates resistance of finish to impact is an abusive test, but is indicative of an important value. The coated metal panel is inserted at the base of a 32 in. drop frame. The panel is placed over a series of hollow metal discs with the coated side of the panel placed downward on the disc. A metal disc contact centered with a ball-bearing device is placed on a cross arm. This arm may be dropped from any point along the 32 in. scale. The extent of rupture will evaluate resistance to impact. The weight used and distance dropped determine the factor.

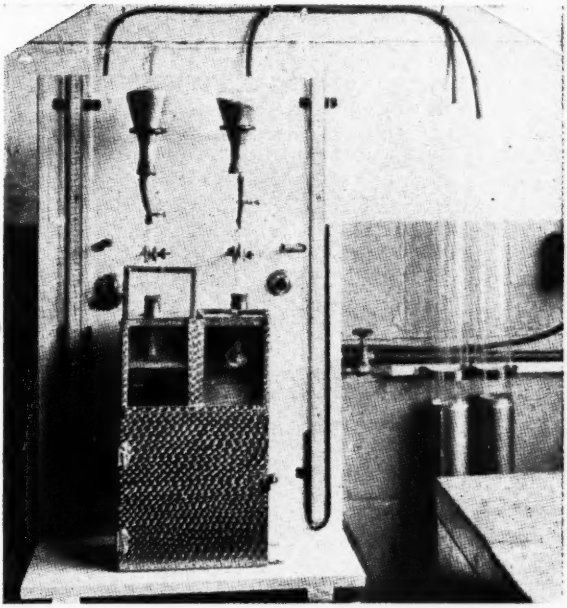

Fig. 2—A sand abrasion testing device for evaluating coatings.

Hardness

Hardness is a property applied to solids and very viscous liquids to indicate solidity and firmness in substance or outline. It is unyielding to a bruising, cutting or penetrating instrument. In viscous liquids the hardness of solids must be measured by the two properties, yield value and mobility, and there must be different kinds of hardness. Being a complex property, it is unfortunate that most of the methods in use attempt to express this property by a single numerical value. But it is, at any rate, recognized that the methods in use do not measure the same kinds of hardness.

In grading minerals, the hardness is based upon the ability of one mineral to scratch another. This scratch involves the factor of cohesion. The scleroscope hardness depends upon the amount of rebound of a steel sphere dropped upon the surface to be tested and involves the factor of elasticity. Since very viscous liquids, like pitch, with a complete absence of yield value and low tensile strength, may yet possess a certain form of hardness, it seems reasonable to assume that a low mobility is essential and distinguishes hardness from toughness, since a tough substance may be deformed, whereas a merely hard substance may or may not. Rigidity is sometimes regarded as a form of elastic hardness.

A Pfund Hardness Meter is used to determine film hardness. This is one of the most satisfactory instruments that has been designed for determining film hardness. It is thoroughly reliable for all types of surfaces, even where a "top tack" exists. This instrument gives results which parallel the findings of practical men using the finger nail test.

All measurements can be made at the time of actual contact between the tool and the film, thereby eliminating any error caused by the resilience of the film.

The general construction of the apparatus is evident in the accompanying diagram as shown in Fig. 3. A brass beam AA is pivoted at P and is supplied with a counter weight at W, which serves to balance the beam in the absence of the weights M1-M2. Impression of the film V is made by means of a transparent circular cylinder of crystalline quartz C which is of ¼ inch diameter. The lower surface is accurately ground and polished to hemispherical form while the upper is flat and is inclined to the horizontal at an angle of 4 degrees.

For the purposes of viewing the test, a piece of clear glass is mounted at G so that a horizontal beam of light from the special light source included with the instrument, may be directed downward through the quartz cylinder, where reflection takes place at the hemispherical surface. The returning beam enters the microscope O the character of the phenomenon under observation being shown in the insert at the upper right hand corner of the diagram. The diagram of the cycle of contact between the hemispherical surface C and the film under test is measured with a micrometer eyepiece.

Instead of measuring the diagram of the circle of contact for a constant load M, it has been found that a much greater dispersion of results could be obtained by varying the load until a circle of fixed and pre-determined diameter was produced. The actual diameter agreed upon was three divisions in the micrometer eyepiece. Rather than fix the exact load required, it is more expedient to put on loads yielding diameters, respectively, too small or too great. By recording both loads and diameters it is possible to calculate the exact load by simple interpolation.

Film Thickness

The Pfund Film Gauge is a simple instrument by means of which the thickness of wet films may be quickly yet accurately determined. It is of particular service in measuring and controlling the thickness of coatings as applied by the roller coating method.

The gauge enables one to determine the shrinkage of applied films upon drying (the thickness of the dry film is usually obtained by means of a micrometer or a dial upright gauge) and when used in combination with the Pfund Cryptometer to determine the number of coats of material to produce complete "hiding."

Essentially the instrument consists of a spherical, convex surface which is forced through the coating layer. If the radius of curvature of the convex surface is known, a simple relationship can be established between the diameter of the circular spot and the thickness of the original coating film.

The general plan of the film gauge is shown in the diagram Fig. 4. A convex L whose lower surface has a radius of curvature of 25 cm. is mounted in a short tube R. The compression springs S keep the convex surface out of contact with the film until pressure is applied to the top of T. The instrument is simply rested on a coated surface and the lens is forced down as far as it will go. Upon releasing the pressure before remov-

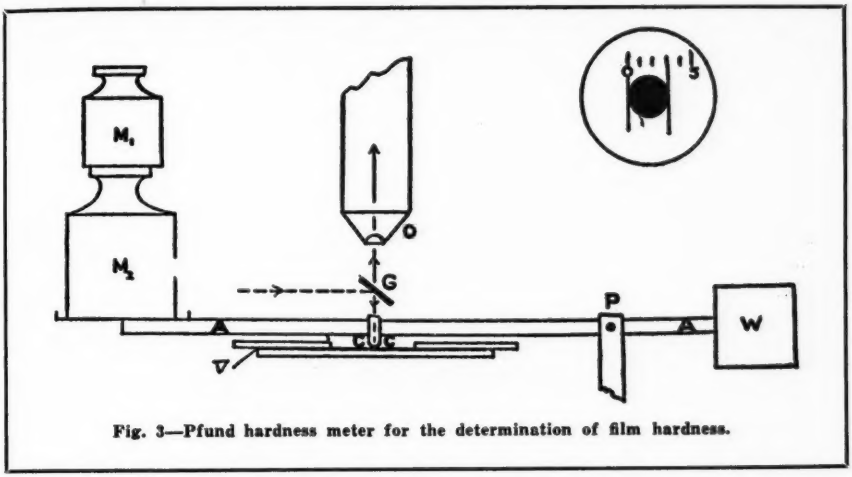

Fig. 3—Pfund hardness meter for the determination of film hardness.

ing the gauge, a circular spot is left on the gauge as well as on the coated surface. The diameter of the spot on the gauge is measured to 0.1 of a millimeter by means of a steel scale which is furnished with the instrument. If the spot is elliptical, the mean of the major and minor axes is determined. A series of ten readings over a given area yields a fair average of the thickness of the film. By referring to a table supplied with the instrument, the thickness of the film in millimeters, as well as the number of square feet which would be covered by one gallon of coating may be evaluated at once.

A number of experiments have been carried out to check the accuracy of the film gauge. In each case a known mass of "coating material" was spread uniformly over a definite area of plate glass and the thickness of the film was calculated in the usual manner. Different results and thickness of layer were used. The results are briefly presented in the following table:

	1	2	3	4
Film thickness by calculation—	0.0444	0.0402	0.0644	0.0638
Film thickness by film gauge	0.0448	0.0390	0.0652	0.0638

Equally satisfactory agreements were obtained on varnish films. The difference being the calculated results and the measurements by the film gauge rarely exceeded 3 per cent.

The highest accuracy is obtained when the film is grainless and the underlying surface is smooth, flat and non-porous. Grit in the material or roughness in the surface coating will have some effect on the accuracy. However, the errors from such causes are not sufficiently large to effect the practical interest of the instrument to users.

Print Resistance

Printing marks, the result of burlap, wrapping paper or braces used in crating have long been a source of concern in Industry. This difficulty seems to be more prevalent in the furniture industry and therefore the detail which follows will deal with printing in that industry.

Materials under test should be thoroughly dried and all volatile material permitted to leave the film. The

material should be polished if that is the procedure and permitted an overnight dry before subjecting it to the test.

A piece of standard 8 oz. duck is placed on the panel and a weight of one pound to a circular area of one sq. inch is placed over the duck. This weight is allowed to remain in place 24 hours. An examination of the film surface should show no printing.

Water and Moisture Resistance

The water or moisture resistance of coatings is of interest both to the metal and woodworking industry. Products which are manufactured may be subjected to moisture at some stage in its usefulness. Refrigerator finishes should be impervious to condensed moisture in kitchens; toy enamels should be impervious to moisture in event a child places the toy into his mouth, and motor car finishes must withstand climatic changes of weather. A severe test for metal finishes involves direct immersion in a container of water. A trough-like container can be used for this purpose filled with water at various temperatures. In succeeding experiments different kinds of water such as hard or soft may be used. A grooved frame arrangement for holding panels, placed in a vertical position, is used. Periodic examination of the finished panels and ratings should be kept. Standards of known water resistance are compared with other materials as there is no known yard stick which measures to perfection. A reason for this statement is the fact of knowing (1) Type of metal (2) Undercoat (3) Enamel (4) Treatment, n.b., air dry or bake of undercoat and enamel, and so on.

Metal coatings can be also subjected to water mist. In such tests the panels are placed in confinement

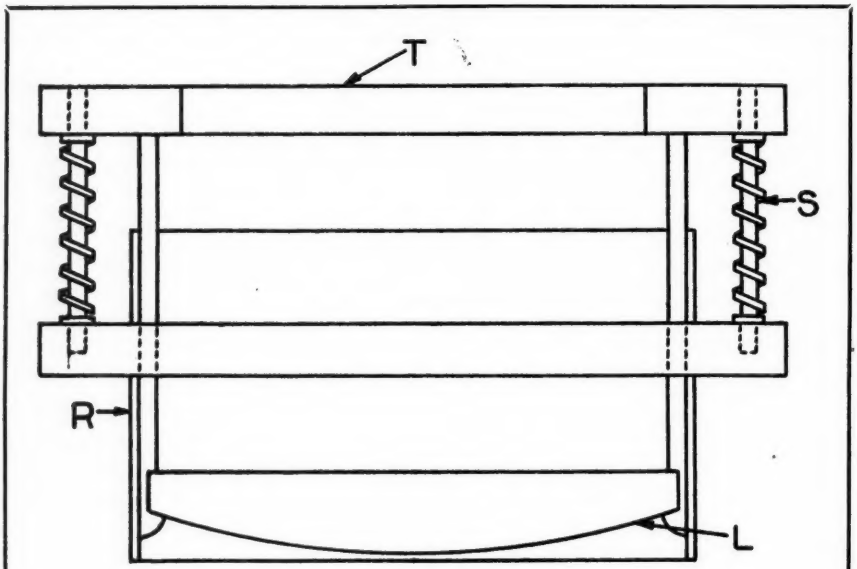

Fig. 4—Diagram showing Pfund paint film gauge.

where a spray of water is directed against a baffle plate so that the "mist" falls on the coating. Here again, there is no yard stick as to rating other than it is or it is not resistant.

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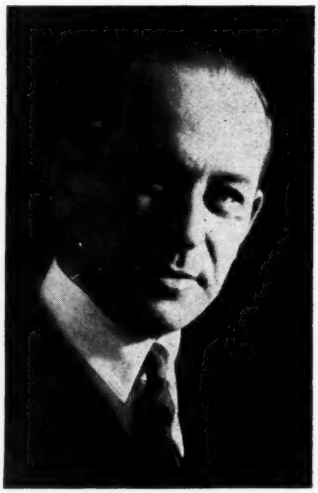
Barrel Finishing of Metal Products

Part One of Sixteenth Article of Series — A Brief History and Factors in the Barrel Finishing of Silver and Silver Plated Wares.

By H. Leroy Beaver

FROM almost the very beginning of this series of papers on barrel finishing of metal products we have had many requests for a description of the instrumentalities and methods employed in the barrel finishing both solid and silver plated ware, and especially from platers who cater to the Hotel, Restaurant, Club and Institution fields, where both hollow ware and flat ware are kept beautifully clean and brilliantly burnished by operating them in revolving barrels with steel burnishing materials together with a soapy water lubricant.



H. Leroy Beaver

While there are several machines on the market at this time, the real beginning of the barrel finishing of such wares occurred in Switzerland. There will be very few readers indeed, to whom the name Jean Uebersax will be familiar in any sense of recollection, but it was he who sometime prior to 1911 perfected a process for performing this work which met with immediate favor in Europe. Almost immediately the major portion of the finest Swiss resort hotels adopted this process, and the early records disclose that literally hundreds of Hotels, Cafes and Institutions throughout Europe almost immediately enthusiastically adopted the process.

The first record we have of the process in the United States dates back to April 7th, 1911, when Jean Uebersax filed application for a Patent, and on this application there was issued on June 3rd, 1913, U. S. Patent No. 1,603,478, which is a method patent and covers as its title indicated a "Process for Polishing Silver Utensils."

Prior to the actual issuance of the Patent however, Mr. Otto W. Schaum, a widely known Mechanical Engineer and his associates of Philadelphia, Pa., purchased the United States rights to the process and inasmuch as the machines used for carrying out

the process in Europe were known as Tahara Machines (A word of Arabic origin signifying "cleanliness") the organization formed in the United States was known as The Tahara Company of America. In October 1913 the American Company first started installing machines for performing the process. The machines used in Europe were not so well adapted to installations in this country and under the direction of Mr. Schaum, President of the Tahara Company of America, working in co-operation with Mr. George Gottlob Rupe of Delemont, Switzerland, a young Swiss Engineer of marked ability, who came to this country to supervise the manufacture, installation and operation of the machines for carrying out the processes, that the machines were completely redesigned and adapted to American installation conditions.

In the beginning there were at least twelve different sizes of barrels in contemplation, many of which were constructed but as time went on it was found that the needs of the American users could be embraced within the range of a small number of units and combinations which have proven most practical. The most popular sizes and the normal capacity of each size is as follows:

8 in.x12 in.—Indicating a burnishing barrel eight in. in diameter and 12 in. long, with an average hourly capacity of 300 teaspoons; 250 tablespoons; 250 silver forks or knives; 6 single portion coffee pots; 9 to 12 sugar bowls or 9 ice cream stands.

8 in.x24 in.—Double the size of the 8 in.x12 in. barrel and with double the capacity of the 8 in.x 12 in. barrel.

8 in.x12 in.-17 in.x12 in.—A combination type for processing both flat and hollow ware. The 8 in.x12 in. barrel has capacity as before noted and the 17 in.x12 in. barrel has an hourly capacity of nine single or double portion coffee pots; eighteen meat platters (up to 15½ in.); nine toast covers; nine vegetable dishes.

8 in.x24 in.-17 in.x24 in.—Combination Type. Small barrel has same capacity as before described. Large barrel has hourly capacity of eighteen coffee pots; thirty meat platters (up to 15½ inches); eighteen toast covers; eighteen vegetable dishes and so on.

8 in.x24 in.-17 in.x36 in.—Combination type. Small barrel has same capacity as before noted, while large barrel has hourly capacity of twenty-seven coffee pots; fifty-four meat platters (up to 15½ inches); eighteen meat covers; twenty-seven toast covers; twenty-seven vegetable dishes, and so on.

NOTE: The maintenance of silverware is quite properly within the province of the scope of operation of the average silver plater, and Products Finishing invites inquiries from silver platers who are interested in this phase of extending their activities in the food service field.

The various named pieces as shown in the capacity chart above are merely indicative of the capacity for certain types of flat or hollow wares. The list of pieces that may be burnished run into the hundreds, but the illustrations as noted will give an idea of the adaptability of the barrels for handling various types of pieces.

The machines as above noted refer, of course, to the original Tahara Machines. There are, however, at this time several other makes of machines

available for carrying out a process identical with that of Uebersax, some of which have gained considerable favor, and have somewhat the same size range. Among these may be noted the Sterling Silver Burnishing Machine of The Josiah Anstice Company, The Lupomatic Silver Burnisher of The Lupomatic Machine Company, The Silverbrite Silver Burnisher of Fred C. Good & Sons and the Paul Kraeft Silver Burnisher manufactured in Jersey City. The latest development, however, of burnishing machines adaptable for the carrying out of this process is a multiple type, moderately priced machine very recently introduced by Munning & Munning, Newark, N. J., which, where there are large quantities of flat ware especially to be burnished we predict will go far toward satisfying a long present demand for multiple type barrel burnishing equipment.

Many of those who have inquired for information regarding these machines and the process have insisted on regarding the Uebersax Patent as a patent covering a particular mechanical instrumentality, which, of course, is not true because the Uebersax Patent is a method or process patent and the machine for carrying out the process itself is only incidental.

In describing the operation of the Uebersax process we could not hope to improve in any sense on the definition of the process as set down in 1920 by Professor William A. Johnson, Professor of Theoretical and Applied Mechanics at the Massachusetts Institute of Technology, a man of unusual attainments who has devoted many years to the study of forces and the effect produced by their action, and who defines the process as follows:

> "The process is one for polishing silver utensils, that is to say, for rendering silver plate and other table utensils for table or culinary purposes brilliant by polishing. The process consists of subjecting the article to be polished to rotation within a polishing medium and producing this rotation while the article is suspended in the polishing medium.
>
> This means the article to be polished is actually rotated within the polishing mass, while suspended in that mass, that is to say, under such conditions that it is not substantially displaced radially from approximately the central position during rotation. Or, in other words, the article is rotated while continuously held approximately central of the mass, and excludes a condition where the article passes in and out of the mass, that is, where the article is sometimes within and sometimes without the mass."

The type of barrels on these machines differ materially from the average accepted commercial type burnishing barrels in that while they are generally polygonal barrels, they are divided on a line somewhat above the center, the upper portion, comprising several sides of the barrel, forming the cover, which are rotated by some driving mechanism and either by belt, chain or worm reduction gear, the barrel in turn subjecting the burnishing mass within it to rotation and the burnishing mass in turn subjecting the article within it to rotation.

The burnishing mass as suggested by Uebersax was one composed of ⅛ in., 5/32 in. and 3/16 in. round steel balls and 1/16 in. x ½ in. taper end steel burnishing pins. This mixture of burnishing materials was used almost exclusively and continuously from 1913 until about eight years ago, but since that time with the advent of other types of machines there has also come a more highly perfected burnishing mixture composed of Balcones, Finbals, Diagonals and Diamonstels

which are all hardened and polished steel shapes designed to effect contact over every part of an article and give predetermined assurance of a brilliant finish over every part of the surface both inside and outside of the pieces being burnished.

The gist of the process is that during the rotation of the barrel or barrels and hence of the burnishing mass, the articles to be burnished are subjected to rotation and hence to the burnishing action of the burnishing mass, while they are suspended or maintained within the burnishing mass in an approximately central position, so that they do not come into contact with the sides of the barrel or with any other articles being burnished.

Prior to the advent of the Uebersax process the only known methods of polishing such articles consisted of polishing by hand using various types of abradant powders or pastes or solutions, and polishing by the use of scratch brushes or buffing wheels. All of these methods were attended by a great wearing away of the silver plate by abrasion, and an incomplete and inefficient polishing due to the inability of such means to reach the crevices, corners and points of difficult access of the utensils, many of awkward shape. (It is estimated that before the use of the process the average life of silverware in the food service field was about six years, after which it required complete replating.) In addition, the old methods necessitated the expenditure of large amounts for the employment of skilled operators such as polishers, as well as laborers required for the work.

Prior to the advent of this process, all old methods of barrel burnishing which employed steel balls, were confined to the polishing or burnishing of comparatively small articles such as collar buttons, jewelry novelties,

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buckles, and so on. These articles, in great quantities, hundreds or thousands of pieces for one operation were simply dumped into a tumbling barrel with a soap solution and the whole mass tumbled about, usually at great speed, and some of the tumbling barrels, as we have noted in previous papers, even having an oscillating motion. It may thus be easily seen that previous methods of barrel finishing as it was generally understood prior to 1911 was simply "tumbling".

It will thus be seen that Uebersax's process (in reality a regulation of the control of the speed of the barrel or barrels which the writer has insistently advocated for years) was the direct antithesis of the old tumbling methods, any one of which would be absolutely fatal to the type of utensils with which he was concerned. His fundamental concept was to burnish utensils of varying sizes and shapes, easily subject to scratching or deformation, by maintaining them suspended within the burnishing mass during the rotation of the barrel, avoiding, or almost avoiding any radial or lateral displacement, so that the large, and in many cases awkward shaped pieces would not be "tumbled", and would not come into contact with the sides of the barrel or with each other. Uebersax was a pioneer in his field. His achievement, or shall we say discovery, was a great one as is attested by the fact that his process has now practically superseded all prior known methods of polishing silver and silver plated utensils of the hollow variety or of flat ware.

We are very often asked this question: "Does not barrel burnishing or polishing have a tendency to remove at least a part of the silver plate each time it is operated in the barrels?" The answer, of course, is NO. In the early days of silver burnishing in the United States the writer was connected with the Sales Division of The Tahara Company of America and well recalls at least two exhaustive tests conducted at that time and that amply answer the above question. The first silver burnishing machine installed in the United States was in the Bellevue-Stratford Hotel in Philadelphia where a silver plated dish was weighed before being placed in the barrel. It was then operated continuously for a period of thirty days after which it was again weighed and the loss of plate or the wear was almost infinitesimal.

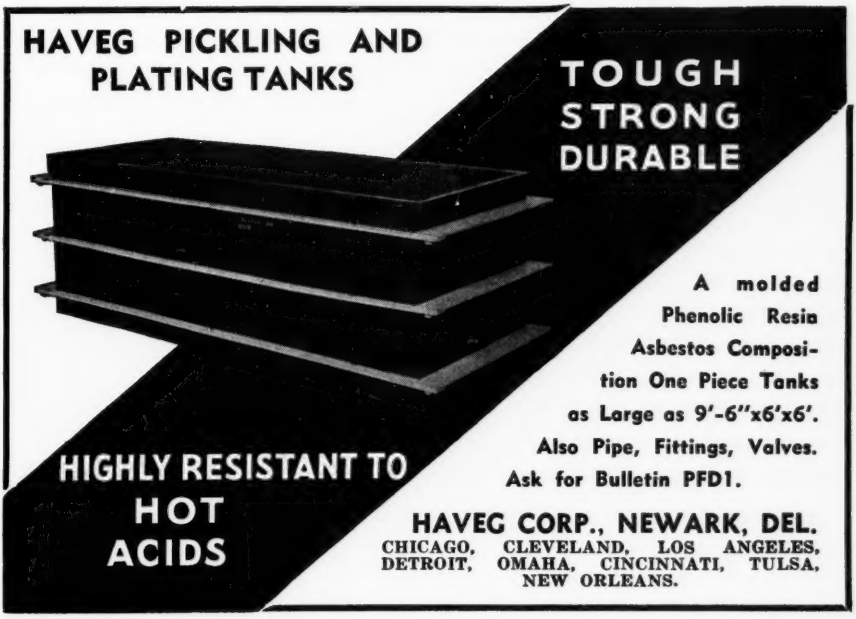
Another test was made by The Gorham Company, well known Silversmiths, wherein a number of silver utensils were operated on for fifty hours continuously, equivalent to approximately ten years of ordinary service conditions. The pieces were weighed both before and after the test. In all but one case the loss of weight was 1/5 pennyweight or less, and in one piece the loss was 2/5 of one pennyweight.

We know of no field of metal finishing or perhaps we should say surface maintenance for cleanliness, durability and appearance, where barrel finishing is as much understood and appreciated as in the Hotel, Restaurant, Club and Institutional field. The average manufacturer of metal products susceptible to finishing by the barrel method will generally protest and shout to high heaven against the expenditure of as much as one thousand dollars for barrel finishing equipment for processing perhaps a million dollars worth of metal products going through regular production. The measure of the appreciation and understanding of the food service field presents a most marked contrast to the manufacturing field as we may easily evidence by stating that in just a few of the better known hotels in the United States the initial cost of their barrel burnishing equipment was approximately as follows: Ritz-Carl-

ton, Philadelphia, Pa., $5685.00; Ritz-Carlton Hotel, New York City, N. Y., $5985.00; William Penn Hotel, Pittsburgh, Pa., $5250.00; Hotel Biltmore, New York City, $7340.00; Hotel McAlpin, New York City, $5365.00; Hotel Commodore, New York City, $9140.00 and the Statler Operated Hotel Pennsylvania, New York City, N. Y., $15,505.00. It is extremely doubtful whether any of these hotels would part with their barrel burnishing equipment for many times its original cost, if it could not be replaced.

It is most interesting to note that even in the formative period which we shall term the first five years, the total expenditure by the food service field for barrel burnishing equipment was upwards of $465,000.00, and it is doubtful whether all manufacturing industry combined during the same period anywhere near approximated purchases of one half that amount. The period from 1913 to 1918 as we have said can only be regarded as a formative one, and in the years that have elapsed since 1918 it would be most difficult to estimate the dollars and cents value of installations of barrel burnishing equipment in the food service field, but up to the time of this writing the total must be many times greater than in the first five year period. In the smaller Hotels and Restaurants there must be thousands of the smaller size machines such as the 8 in. x 12 in. and 8 in. x 24 in. It would be much to the credit of the average American manufacturer of metal products susceptible to finishing by the barrel method if he or they would more fully and completely recognize the adaptability and practicability of this process when properly applied by the use of intelligently selected equipment and methods of operating that equipment after it has been installed.

In Europe, many cities have Silver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Laundries, where the smaller hotels, restaurants, cafes, clubs and institutions may have their silverware, both flat and hollow, barrel burnished at stated intervals and at nominal monthly fees, without undergoing the expense of the installation of the necessary barrel burnishing equipment. It is this feature that has prompted a host of inquiries from silver platers, as to the advisability and practicability of offering such a service in the United States. Many of our foremost silver platers are in reality "silversmiths" in all that the name implies; skilled artisans who understand silverware in its every phase and many of them enjoy a wide patronage from the food service field both in replating and repairing, and it is more particularly for their enlightenment that this subject is included in the current series.

To proceed to a description of the carrying out of the process would involve more space than available in one issue of Products Finishing, hence we must regard this paper as Part One covering the discovery of the process, the introduction and development of the barrel burnishing of silverware as conducted in the average of American institutions. A further paper covering methods of operation and materials used, will follow in a later issue.

Bristol Bulletin No. 503. A Reset Free-Vane Air Operated Controller is described in Bulletin No. 503 which is now being issued by The Bristol Company, Waterbury, Conn. This unit is a new control instrument, with wide throttling range and automatic reset that provides for point-control. The device which provides for these features is of special design and lends itself to ready adjustment by the user, to meet the requirements of the process involved.

The Reset Free-Vane Controllers are adaptable to various type of continuous processes, which involve the control of such variables as temperature, pressure, vacuum, flow, and liquid level. In many temperature control processes, for example, there are differences in respect to the time required for a change of temperature in the system, when the cooling or heating medium is added through the control valve. In providing for a wide throttling range with automatic reset for point-control, these instruments are especially suited for applications of this type.

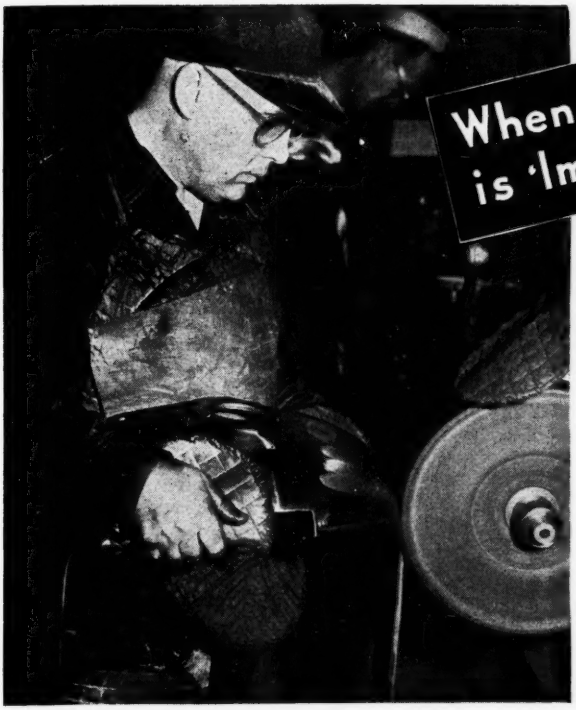
Thus, with these new Reset Free-Vane Controllers, any load change, accompanied by a movement of the pen away from the control point, produces a change in the controlled air pressure, of sufficient value to give the diaphragm control valve the required opening to bring the variable back to the control point. The design of the reset operating mechanism makes it possible to obtain this change automatically, at a rate that corresponds to that required by the particular process being controlled.

The instruments operate on the basic Free-Vane principle of pneumatic control, employed by The Bristol Company for many years. This system consists of a thin vane, floating between two opposing small jets of air, which throttles the discharge from the jets by passing between them without actually coming in contact with the nozzle surface. Thus, the measuring element of the instrument is not restrained and the record produced by the pen at any point on the chart is a true representation of the measured condition.

A copy may be obtained free upon request.

"Facts about Spekwite". This is the title of a 12-page bulletin which is now being issued by Special Chemicals Corporation, Dept. F, 30 Irving Place, New York, N. Y. Spekwite is a specially developed ternary alloy plate which is electrolytically deposited on metals from an electrolytic solution of Spekwite No. 12 plating salts.

Spekwite plates directly over nickel, German silver, brass, bronze, copper, gold, silver, iron and steel. It is also said to plate directly over hard solders and also many of the soft solders. Spekwite plated work can be soldered and welded. Such items as novelty jewelry, metal novelties, housewares, fixtures, reflectors, radio parts, optical frames, umbrella frames and handles, watch and clock parts and casings, wire products, metal stampings, screw machine products, tools, and so on can be plated with Spekwite. Many other interesting features of Spekwite are included in this bulletin which is available to anyone who will write to Special Chemicals Corporation, Dept. F. 30 Irving Place, New York, N. Y.



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NORTON ABRASIVES

Capillarity and Surface Tenacity of Polishing Abrasives

This Article Describes Two Important Properties of Electrically Fused Alumina Abrasives Necessary for Proper Performance of Polishing Wheels.

By Henry R. Power

AMONG the current developments of chemical technology are the number of "wetting agents" now produced in commercial quantities by many chemical concerns. These have been popularly described as making water "more wet", that is, changing the surface tension of water when added to it, even in unbelievably small quantities, so that it more readily wets and penetrates familiar materials such as textiles.

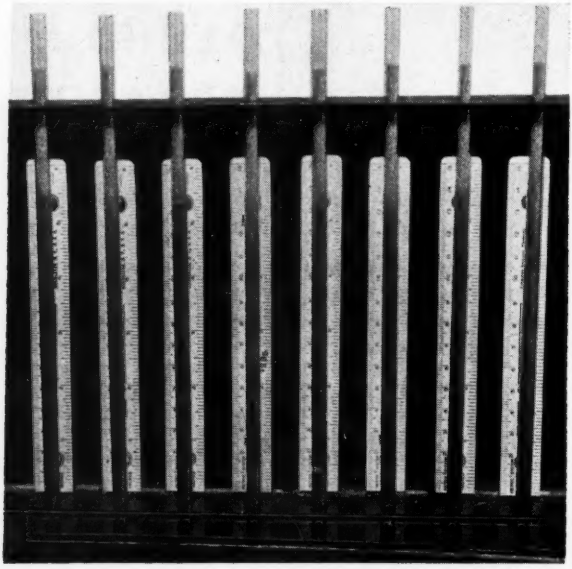

Fig. 1—Capillarity can be quantitatively measured by the abrasive producer by noting the rate of water rise in a glass tube of narrow bore which is filled with abrasive and stands in a trough of water such as shown herewith.

Instead of adding it to the water, one experimenter immersed a duck in the wetting agent, and when the animal was freed to paddle its way in the accustomed manner in its favorite pool, it promptly sank below the surface, much to its bewilderment, but to the evident satisfaction of the experimenter who doubtless recorded the experiment as a positive success.

What happened was, of course, the rapid penetration of water through the normally

water resistant feathers of the fowl, which was the purpose of the test. The feathers of the duck, as nature designed them, have low capillarity, that is to say, they do not become wet with water because of their structure, and oil content. This property of the duck's feathers supports its life as a sea-going animal, but it is disastrous when applied to abrasive grains. In fact polishing grains which contain an oil film on their surface are really lame ducks in reverse, because the wet glue film does not readily wet them, in the process of making a set-up wheel in the plant of the polisher.

Since glue is used hot and quickly jells, the importance of spreading it completely, quickly and thoroughly on every granule of abrasive that is applied to the wheel face, is paramount to the success of the polishing operation. Abrasive grains not wet with the glue film readily leave their setting in subsequent use, hence their abrasive value is zero. It means an economic loss to the polisher both in grain value and in scratched work from the loose grains. The polisher can readily determine qualitatively

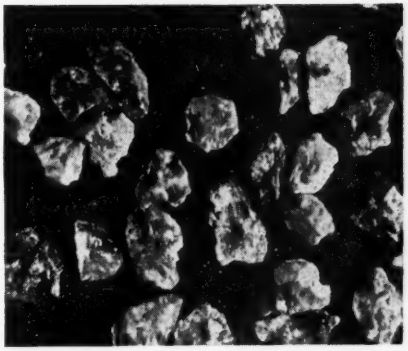

Fig. 2—Illustration showing Aloxite T. P. surface tenacity abrasive.

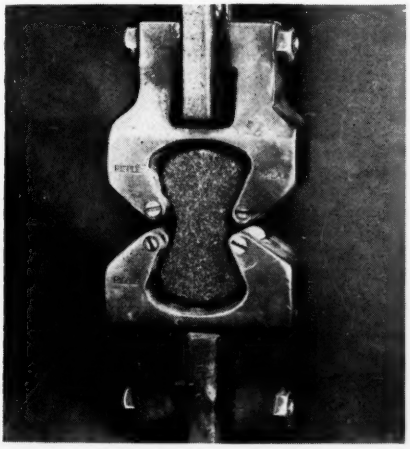

Fig. 3—(Right)—Illustration showing tensile strength machine used for pulling apart abrasive briquettes.

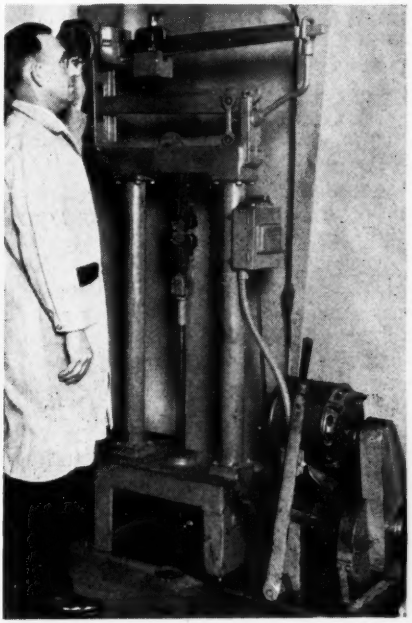

Fig. 4—(Above)—Close-up view showing the briquette in the jaws of a tensile strength machine.

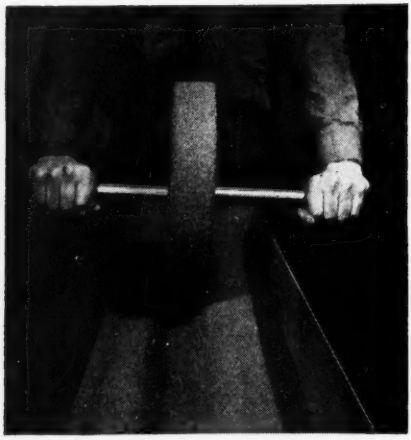

Fig. 5—Illustration showing how surface tenacity abrasive packs under the set-up wheel.

whether his grain has become contaminated by oily dusts and vapors by the simple method of dropping water from a medicine dropper on a pile of abrasive grains. The drop remains as such rolling down the pile without soaking into it, exactly like a gentle rain falling on a dusty road. By use of this method he can discover the source of contamination and remedy it.

Capillarity can be, and is, quantitatively measured by the abrasive producer by noting the rate of water rise in a glass tube of narrow bore, filled with abrasive standing in a trough of water as shown in Fig. 1. Standards for each grit have been set for each grit size and these must be met in the practice of the grain maker before the material is packed for shipment. If held in this condition by the polisher, he can be assured of maximum wetting by the liquid glue film.

Grain that shows a rapid rate of rise, is known to have high capillarity. But this is only the half-way point of determining the usefulness of polishing abrasives. The polisher wants strong adhesion between the individual abrasive granules and the dried glue film after the wheel has been conditioned.

That abrasives may be bonded to different degrees is evidenced by the variety of bonds used for grinding wheels, which perform operations somewhat analogous to polishing wheels. Shellac, rubber, resinoid, silicate of soda and a glass known as vitrified bond, are all useful and specific in their bonding effects on abrasives. Since the bond could not be changed on polishing grains, the grain producer proceeded to develop the surface of the grit so that the usual glue bond could be continued in use but with greater surface adhesion than had been heretofore achieved.

The greater strength of the bond between glue and surface tenacity abrasive was proved by making up briquettes and after conditioning, pulling them apart on a tensile strength machine as shown in Fig. 3. This test showed that the improvement of adhesion over old time abrasives was represented by figures of 457 pounds per square inch for the old and over

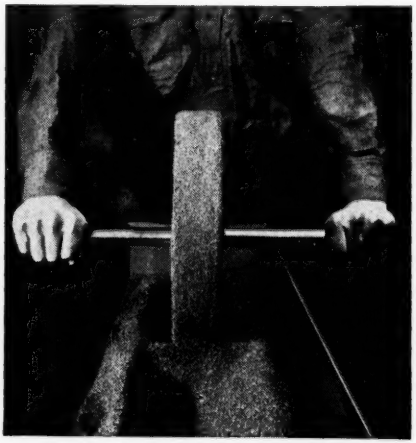

Fig. 6—Untreated abrasive piles up ahead of the polishing wheel.

1,110 pounds per square inch for the improved abrasive, now available in commercial quantities in all the popular sizes. This treatment of the grain surface, moreover, may be performed in different degrees to give corresponding adhesive values with glue, and so for light duty work an intermediate abrasive is available for weaker contact strength.

Not only does surface tenacity abrasives show improved adhesion of glue to grit, but also reveals a revolutionary change in the structure of the polishing wheel made up with them. It was soon noted that the newer treated abrasives packed differently in the trough as shown in Figs. 5 and 6, where the old glossy, untreated abrasives piled up ahead of the wheel, sliding away from it, requiring much pounding of the wheel face into the trough grains, a slow laborious job, the treated abrasives packed under the wheel, were readily embedded in the glue film because of the cushion effect, without side-stepping, and with no shedding in the green when the wheel was racked for conditioning. This property is measured qualitatively by the thumb test, as shown in Fig. 7, or quantitatively by the Penetrometer test as shown in Fig. 8.

It was also noted that surface tenacity abrasives gave an open coat on

Fig. 7—The thumb test of the polisher can be used on surface tenacity abrasive.

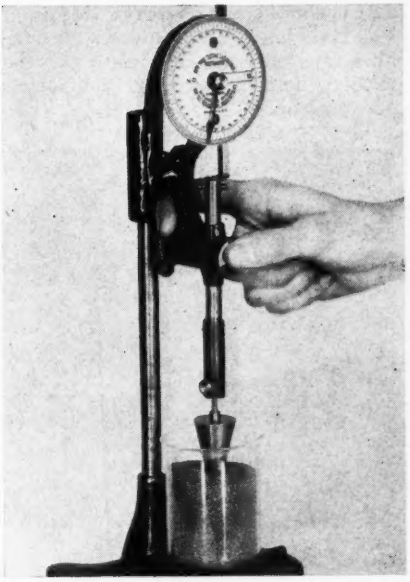

Fig. 8—The packing of surface tenacity abrasive can be measured by means of the Penetrometer.

the wheel face. This means a definite clearance between the grains, less filling of the wheel by abraded material, less frequent dressing, hence, longer life. In other words, less abrasive does more work. A section of a set-up wheel is shown in Fig. 9.

Open coating had long been recognized in the abrasive paper and cloth industry as highly desirable in many applications, but until the advent of a surface tenacity abrasive this structure had not been available to the polisher. The experience of the producer in making abrasives for the various applications of industry was of value in this development.

It is clear from the foregoing that Capillarity and Surface Tenacity are twin properties relating to the glue-to-abrasive union. One makes sure that the film coverage by the liquid glue is thorough while the other guar-

antees complete strength of this union. The combination is found in the ideal abrasive, no longer a laboratory curiosity, but a regular commercial product controlled by scientific instruments and tests in every stage of its manufacture.

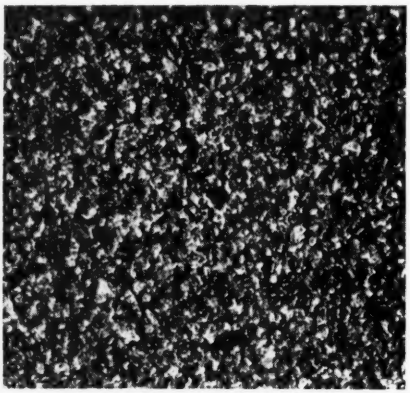

Fig. 9—Illustration showing the open coating of surface tenacity abrasive on the set-up wheel.

American Injector Company Bulletin No. 41. Water separators for gas and compressed air systems are described in Bulletin No. 41, which is now being issued by the American Injector Company, 1481 Fourteenth Ave., Detroit, Michigan. Compressed air and gas as it comes from the compressor is at a high temperature and with it comes considerable moisture that does not condense and separate out until the air or gas has cooled. This condensation makes pneumatic machinery sluggish in operation, washes away lubrication and causes deterioration of packing. It is also said to result in rust accumulating in the system and it is responsible for the average common pipe line, pneumatic valve and machinery troubles.

Moisture quite often causes the spoilage of work in spray painting. Moisture condensed in pipe lines reduces the effective carrying capacity of the line and when collected in low spots causes "water hammer."

The No. 400-W Water Separator described in Bulletin No. 41 is an automatic device for removing any accumulation of moisture rapidly and without any attention whatsoever. The No. 400-W Water Separator is easy to install, is tested to 250 lbs. and when connected at any point where moisture accumulates, it is said to be guaranteed to remove all condensate or moisture that may be present.

Copy of Bulletin No. 41 free upon request.

Lupomatic Type S Units. Lupomatic Type S Tumbling Units are described and illustrated in a 4-page bulletin which is now being issued by Lupomatic Tumbling Machine Co., Inc., 4510 Bullard Ave., New York, New York. Illustrations on the center pages of the bulletin show the general line of equipment manufactured by this firm. The service rendered by the Lupomatic Machine Company's designing department and engineering department is outlined. In addition to the description of Lupomatic stands, this bulletin also describes hard maple linings, mechanical sifters, and also tumbling compounds for finishing metals. Copy free upon request.

Better Products Better Sales—With Rectox Rectifiers is the title of a beautiful 12-page illustrated booklet which shows how the direct-current rectifier of simple design and sturdy construction opens up wide possibilities for design of new products and improvement of old designs. This booklet is now being issued by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pennsylvania.

The booklet outlines the various characteristics of Rectox Rectifiers and gives a list of applications and points out advantages. Copies may be obtained at the nearest district office of the Westinghouse Electric & Mfg. Company or from headquarters at East Pittsburgh, Pennsylvania.

"Hancock 500 Brinell Bronze Valves". This is the title of an 8-page catalog which is now being issued by Hancock Valve Division, Manning, Maxwell & Moore, Inc., Bridgeport, Connecticut. This catalog describes and illustrates Hancock's complete line of bronze valves. Particularly featured is the line of Hancock 500 Brinell supervalves with nail-smashing hardened stainless steel seats and discs. Copy free upon request.

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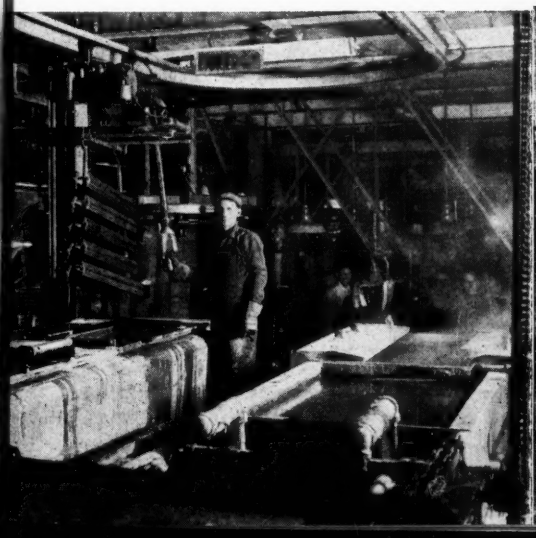

Porcelain Enameling Experiences and Developments in Australia and United States, Part IV

By Fred M. Burt

IN THE Metters plant referred to in the previous articles by this writer in PRODUCTS FINISHING, as in nearly every other enameling plant with which the writer has been acquainted, there was a lack—in most instances a very great lack—of high standards in the matter of housekeeping. Plant good housekeeping is even more essential in an enameling plant than in most manufacturing plants, due to the very nature of the work. The enamel is applied as a finish—usually as a white finish—and cleanliness and order are first essentials in a plant of this nature.

The enameling plant manager who expects to operate his plant on the most modern lines; who is planning to turn out the highest quality of work at the lowest possible cost should consider these questions: (a) Does the work progress through the plant in a systematic and orderly manner? (b) Is there a place for everything and is everything in its appointed place? (c) Is there a full complement of the accessories needed on each operation? (d) Has every possible hazard been guarded and have all the safety appliances, signs, and first aid equipment necessary been provided for and in their places? (e) Has proper provision been made for lockers, and for sanitary and cleansing equipment? (f) Have storage facilities been provided, in convenient locations, both temporary and reserve, for all equipments and materials and with efficient transportation? (g) Is there a scheduled cleaning-up of wastes and accumulations, closely tied in with salvage operations?

Within the past few years many important advances have been made in the industry generally, but in the plant under discussion the idea seemed to prevail that if the operating spaces appeared to be clear and open, with an air of neatness, nothing more was necessary. True, a certain amount of superficial neatness prevailed, but there was no system to it. True efficiency cannot be claimed as a result of doing a task properly once; it can only be developed as a result of correct habits.

A concrete example of practice that needed correcting (and was) was found by the writer in an American kitchenware plant. When dies were taken from the presses in the stamping department, they were placed on lift truck platforms and moved into the die shop or elsewhere where storage space could be found. There the die, perhaps with parts separately stored, lay until it was needed again. Then the hunt for the die was on, so that it could be dressed and put into

service. These die hunts were marvelous. One that the writer knows of took a day and a half.

The fact that space was at a premium made the need for organized storage all the more imperative, and the answer lay in the adoption of racks and shelves. When the dies were placed on the shelves, the lighter ones, which could be handled easily, were placed above, with the heavier ones on or near the floor. Dies that were seldom used were relegated to a storage shed; trucking them back a few times a year was better than storing them in space more urgently needed for the dies that were in more constant use.

The die racks were marked off into divisions, with the divisions indicated by capital letters, and the shelves were labeled with small letters beginning with "a" to indicate the shelf nearest the floor. Then the vertical sections were numbered; thus the location of each die was indicated by three symbols. An index sheet was compiled with the names of the dies and their location symbols, making it possible, by reference to the sheet, to locate any die instantly.

All dies for the same wares were placed together, and the dies that were most frequently used were located closest to the stamping department. When properly set up and in operation, this storage equipment and system not only saved a great amount of time that otherwise would have been wasted in searching for dies, but it resulted also in an appreciable increase in production.

This discussion brings up the point that in many plants some one employe is depended upon to know the locations of all dies and tools—and very often does. He is a walking card index, and may function very well as long as he is on the job. But sooner or later something happens; the man with the card index mind is injured, or ill, or leaves, and then production drops while everyone connected with the job hunts for dies. The ultimate result is the installation of some kind of system for locating dies, but the system should have been installed first. And the system should be so efficient that dies, tools, or other supplies could easily be located by a new employe after he has been given a few words of instruction.

To this Australian plant were brought many truck-loads of racks, of all varieties, from another plant, and these racks were arranged about the plant at points where they would be most convenient. Racks and shelves were numbered and lettered, plainly and this system was carried out until a place had been provided for everything. Then the fun started—to keep everything in its appointed place. Establishing habits of order took incessant hammering and considerable bickering with those who could not understand the necessity of having definite places for everything. However, each day saw improvement, although at times it was found necessary to impress an employe by giving him a week off without pay.

Old stencils were collected from a huge, dust-laden pile and placed in a distant, unused room, in racks that allowed indexing. New stencils were kept in racks that were close at hand. Drawers were provided for blueprints, and tongs were hung on wall hangers. Well-designed bins of an efficient size were made to hold the chemicals, and were properly marked and placed in the proper order to facilitate making up batches. Frit was stored in bins in the same manner. Oxides were placed on wall shelves under canvas curtains stenciled on the outside.

Materials required in the different steps of operation were stored in racks or on trucks which were positioned according to a carefully worked out plan. Coated ware that

was ready for burning was arranged on movable racks which were placed in line in the order of use. Thus a place was provided for every individual item of value, and when it lost its value it went to the scrap pile. Even the scrap pile had its limitation as to size, however, within which it was kept by periodic trucking to a public dump.

In another American enameling plant, which was both large in size and ranked as up-to-date and successful, the writer found that the first task to be accomplished was that of moving to the dump and out-of-the-way storage more than 100 tons of residue enamels, chemicals, refractories, clays, broken equipment, damaged containers and tools, and plain dirt.

Many milled enamels had been put into containers after a trial run, presumably for future use. The foreman or superintendent knew all the details concerning each of those enamels at the time, and intended to remember them for future consideration. However, he didn't. A simple system of numbering the container and recording the details and number of that container in a book would have preserved a great deal of useful and sometimes expensive information. All except the very newest additions had to be thrown away.

The little accessories necessary to the operation of an enameling plant are too numerous in variety to mention and in the same ratio too hard to keep track of, unless a definite system for keeping track of them is used. In some cases the employes develop the habit of carrying them off. But the system will solve the problem, and the system should begin with provision for the storage of these accessories and the allocation of responsibility for them to certain individuals.

For instance, the little carborundum grinding cones supplied to the man who sharpened the furnace tooling were checked into the department office and he was charged with the responsibility for them. He was given a notebook in which he entered the date of receipt, source of supply, cost, number of pieces, and so on. The date of failure and time each was in service was also recorded for future reference. This same system was applied to all other tools and materials, so that nothing was unaccounted for. Comparative costs and performance records were kept, and all at no other expense than the cost of 18 small account books.

As a part of the program, waste receptacles of good size were strategically placed and emptied daily. Habits of cleanliness were fostered by severely censuring any employes who were discovered throwing refuse on the floor. All outside windows were cleaned and a regular cleaning schedule was established. The interior of the plant was brightened surprisingly and an appreciable saving was made on electricity.

A safety program was established, including a complete inspection of the plant for safety purposes at regular intervals. Wherever possible, belts, gears, and other moving parts were guarded, guards and screens were placed in position where other hazards were found to exist, and signs were placed where guards were impracticable. Special training was given to employes working on the more hazardous occupations. Pickleroom workers were supplied with the best rubber boots, aprons, and gloves. This is standard practice, of course, but a point was made of seeing that they were never allowed to become too badly worn. Extra supplies of all of these items were kept in stock and the foreman was charged with responsibility for keeping track of them.

Up to this time the first aid sup-

plies had been kept in the shipping room, at a distant point. These supplies were left there, but similar outfits were installed in each of three other convenient places where an employe on each shift was trained in first-aid methods. Crutches and a stretcher and a good couch were placed in the ladies' room. Specific arrangements were made for transportation for ill or injured persons to the nearest hospital or other proper destination regardless of the hour.

In the ladies' room, which was of good size, a partition was moved to make more space, new lockers were installed for those who had been "doubling up," all lockers were repainted, dining tables were painted white, and a new stove and large urn for tea-making were installed. Time was taken out for tea each morning at 9:30 and at 2:30 P. M. A matron looked after these details and made suggestions concerning details which might contribute to the comfort of the female employes. No expenditure that can be made will pay better dividends.

Among other things, we purchased an American heavy duty vacuum cleaner and provided for its use by having the electrician install a series of electric outlets at intervals about the shop. A vacuum cleaner is a valuable piece of equipment around an enameling factory; a broom simply pushes a certain amount of the dirt into a new location, but a suction cleaner will gather the dirt up and keep it bottled.

To ensure the highest quality of work possible, we established definite standards of quality, to be passed upon by qualified inspectors at every logical point in the process. Any unit under standard was cast out for immediate reworking. Items reworked in the second coat can still be brought up to first quality whereas if they are reworked in the third or finish coat there is a greater chance—often a certainty—of loss. The inspectors were systematically checked by the foremen, and these in turn by the writer, whose results had to meet the approval of the customer. To assist in this checking, samples of finished wares with defects and finished pieces illustrating the various causes for rejection were retained.

To carry out this program, facilities were necessary for accurately controlling the processes and the respon-

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sibility for the controls were specifically alloted. We installed a laboratory with a small furnace and two experimental smelters, and acquired complete titration equipment for the pickleroom as outlined in the best textbooks on enameling. An impact tester was built to approved plans. A young chemist was hired and trained to use this equipment.

Enamel set-ups were determined by the use of flow meters and specific gravity testers. Plans were made for all other standard methods of testing as fast as the personnel could be trained. It is useless to go too fast with this program as tests are not of much value unless they are correct.

The next questions are: What working standards and specifications are available for reference and for employe instruction? What combined planning can be done by production and control supervisors? What exact cost and control record is kept? These points have been covered, and a detailed report would fill a book.

What production, cost, consumption, quality percentage, waste, salvage, or other graphs can be kept for periodical comparisons?

One main chart was maintained, covering a three-months' period. By using lines of various colors to indicate the different records, the chart was made to show the daily production in pieces of kitchenware, stove work, signs, and all other products, both firsts, seconds and rejects. Monthly and weekly totals were written in. Another record was kept of weekly comparisons between sales volume of productions, which is more fair than total volume of pieces. These records were backed up by the report sheets previously mentioned, which furnished records on every matter of conceivable value but none that was not worthwhile. All these records were maintained by one man.

One more point should be emphasized before coming to the conclusion of this series of articles. This writer has called on enameling plants (some 140), in both sales and engineering work, through many years. In order to keep up with the industry and as the best preparation for such a job as the year's work that has been somewhat outlined in this series, he has found it vitally necessary to keep posted on all enameling and allied developments. The only practical way to do this is, of course, by reading and digesting the news of the industry as brought to the individual by the trade press.

For the man who wishes to keep up with the times in matters pertaining not only to enameling technique, but also to plant layout, industrial relations, factory management, and so on, these seven magazines will be found invaluable: Enamelist, Products Finishing, Ceramic Industry, Ceramic Age, American Enameler, Better Enameling, and Factory Management and Maintenance. The shop library should also contain such books as "Enamels," by Andrews; "The Technique of Porcelain Enameling," by Hansen, and "Enameler's Handy Helper," published by Industrial Publications. And no man who can organize his job properly is too busy to have time to read the publications pertaining to his industry and his job.

"Brown Pneumatic Remote Transmission". This is the title of a 4-page folder which is now being issued by The Brown Instrument Company, Wayne & Roberts Aves., Philadelphia, Pennsylvania. The system described in the folder was developed by The Brown Instrument Company for remote transmission of measurement and control in hazardous atmospheres and where the use of electrical transmission is not advisable. The principle of operation of this system and the simple, rugged construction of the transmitting unit are illustrated by means of schematic diagrams. Copies free upon request.

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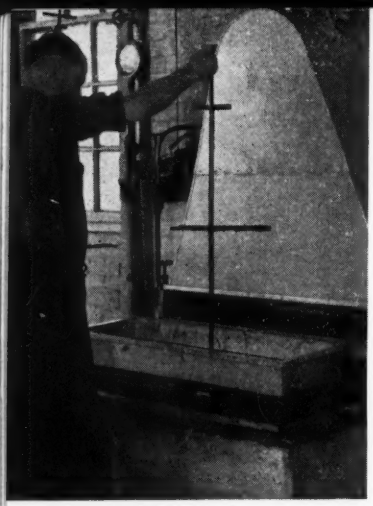

PRACTICAL APPLICATIONS of MODERN EQUIPMENT

Wheelabrator Tablast Facilitates Cleaning Stove Plate

A specially designed Wheelabrator Tablast has just been installed in the plant of a well-known stove manufacturer by The American Foundry Equipment Company, 555 S. Byrkit St., Mishawaka, Ind., for handling both the rough blasting and finished blasting operations required for cleaning stove plate prior to enameling, painting, japanning, and so on. In developing this machine, an illustration of which is shown herewith, American engineers received the cooperation of several of the leading stove manufacturers, who acted as advisors in designing certain features of this piece of equipment.

Breakage is said to be reduced to a minimum by the use of this machine. The "heart" of this machine is the Wheelabrator airless abrasive blasting units. Two of these units are mounted in such a position that work passing through the blasting zone is completely showered by a continuous blast of steel shot or grit.

The Wheelabrator principle of airless abrasive blasting employs centrifugal force in throwing the abrasive on the work. Abrasive is fed by gravity from an overhead storage hopper to the center of the bladed Wheelabrator wheel, from which it is hurled by centrifugal force onto the work.

After striking the work, the abrasive drops into a hopper feeding to a bucket elevator which raises the abrasive to a point above the machine where refuse, scrap metal and other foreign materials are screened out. After the operation the abrasive passes through a special sand separator which removes any sand present in the metallic abrasive, thereby insuring a uniform, clean abrasive. The storage hopper then receives the cleaned abrasive for re-use.

Work to be cleaned in the machine shown herewith is carried through the cabinet on four tables, each of which is 48 in. in diameter. These tables are mounted on a spider which carries them in and out of the cleaning cabinet. A rubber covering over the

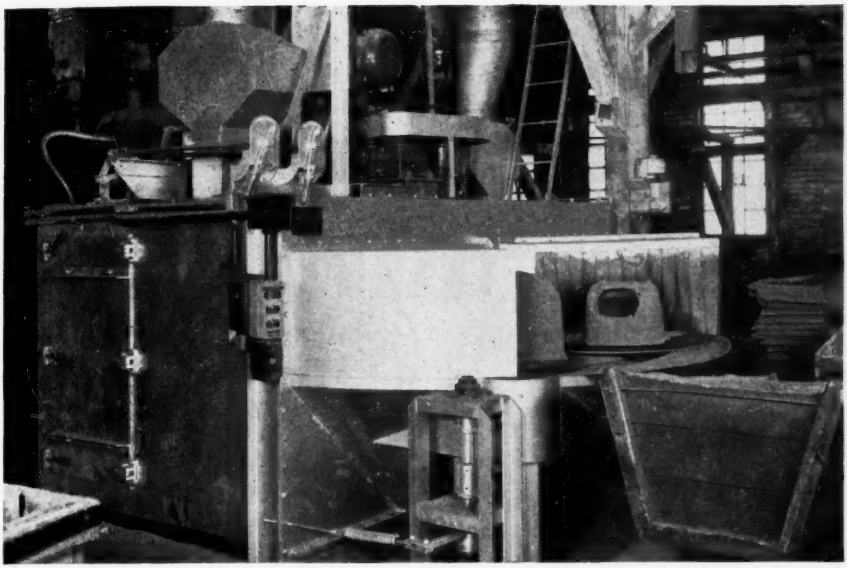

Illustration showing Wheelabrator Tablast designed for use in cleaning stove plate.

tables shields the metallic surface from blasting wear. As the tables pass through the blasting zone, they are caused to revolve so that every surface of the work is fully exposed to the action of the abrasive.

When work is being cleaned for finish enameling, an electrically timed indexing system controls the movement of the tables in and out of the blasting zone. Each table rotates for a predetermined length of time under the blast so that the work is given a thoroughly intensive cleaning.

Cranes, Hoists, Tramrail Systems, Carriers with Motor Operated Hoists, and Overhead Materials Handling Devices. Cleveland Tramrail Division of Cleveland Crane & Engineering Co., Wickliffe, Ohio, is issuing a series of folders on each of these subjects, all of the folders themselves being described in Folder G-138. This folder, or any of the sets of the folders pertaining to any of the various subjects given, can be had by addressing this firm.

"Bob's Burning Bar Booklet". A revised edition of this booklet is now available from Ferro Enamel Corporation, 4150 East 56th St., Cleveland, Ohio. The booklet shows sketches of the various standard patterns available in "Fahrite" heat-resisting alloy tools used for burning porcelain enameled wares. Copy free upon request.

Flexible Shafts and Machines. In this 72-page catalog, N. A. Strand & Co., 5001 N. Wolcott Ave., Chicago, Ill., presents the various types of Strand flexible shaft machines suitable for a wide range of operations, including grinding, polishing, buffing, scratch brushing, rotary filing, sanding, drilling, reaming, nut setting, screw driving, and so on. Numerous models, attachments and accessories are illustrated and described, and installation photographs are employed to give the reader an idea of the many applications of these machines. Copy free upon request.

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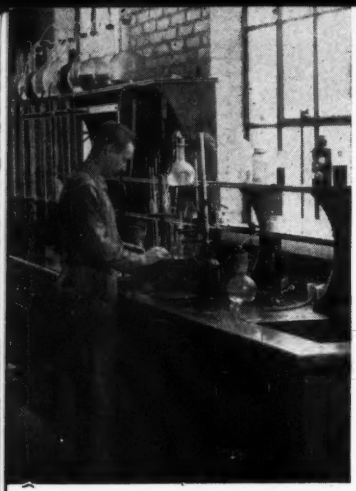

the FINISHING FORUM

Practical Method of Handling Sandpaper or Emery Cloth for Finishing Rounded Metal Surfaces

By Frank Bentley

PIECES of sandpaper or emery cloth are easy to handle and work with over rounded metal surfaces when used, as shown in the illustration, with a porous rubber wallpaper cleaning pad. The abrasive paper or cloth should be cut into strips or pieces slightly larger than an ordinary porous soft rubber wallpaper cleaning pad.

The soft rubber affords sufficient friction on the smooth side of the paper and enables the hand to easily move it under light pressure, thus covering all of the surface as the hand moves. The hand does not tire and the paper or cloth can be worked with until they are useless as an abrasive medium. The ordinary soft rubber pad is of just the right size for the hand to grip.

With the use of the porous rubber wallpaper cleaning pad neat work can be done on either outside or inside rounded metal surfaces.

Fig. 1—Illustration showing the use of a porous rubber wallpaper cleaning pad in connection with a piece of sandpaper for use in finishing rounded surfaces.

The Use of a Wetting Agent to Prevent Pitting In Hot Nickel Solutions

By E. A. Blount

Most of the dull nickel deposits and many of the bright nickel deposits of today are produced in hot solutions of the Dr. Watte type. Such solutions contain about 32 oz. per gal of nickel sulfate, 4 to 10 oz. per gal. of nickel chloride, and 4 to 6 oz. per gal. of boric acid. The operating temperature is usually 120 degrees F., the pH is 5.6 to 5.9 (3 to 4 for bright nickel), and the current density 20 to 50 amperes per square foot. While pitting in such solutions is not common, still it can develop and become very troublesome. Since hot nickel solutions are seldom over 80 per cent efficient as compared to an efficiency of 92 per cent for cold solutions, the tendency for the discharged hydrogen gas bubbles to form pits is greater in the hot solution. Pits can be caused also by dissolved air, excess oxygen, or dirt particles in the solution.

The Use of Hydrogen Peroxide

For a long time the most common, most effective, and simplest method of eliminating gas pitting in nickel solutions was the addition of small quantities of hydrogen peroxide to the solution. The hydrogen peroxide tends to react with the liberated hydrogen gas and prevent the formation of pits. The chief advantage in the use of hydrogen peroxide is that it decomposes eventually to water and adds no troublesome foreign impurity to the nickel solution. However, hydrogen peroxide added to hot nickel solutions sometimes causes a loss in ductility of the nickel plate. This is particularly noticeable in dull nickel plate which must be buffed. Also, hydrogen peroxide can not be used in most bright nickel solutions because it "poisons" the addition agents which produce a bright plate. Furthermore, hydrogen peroxide has no effect on dirt pitting or that caused by dissolved air and oxygen.

The Use of a Wetting Agent Such as Metanol

Recently there have been developed several similar products which can be used to replace hydrogen peroxide, either entirely or in part, as an anti-pitting agent in hot nickel solutions. These compounds are known by various trade names such as Ecconol, Wetanol, Sulphatate, Magnus N.X., Harshaw XXX-D, and Metanol. Metanol, a representative member of the group, is an alkyl aromatic sodium sulfonate having strong wetting properties. Added to a hot nickel solution in amounts up to 0.35 oz. per gal., Metanol eliminates the pitting usually caused by gas of any kind or dirt in the solution. The Metanol should be added to the hot nickel bath as a so-

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lution and then stirred into the bath. The Metanol solution can be made by dissolving the required weight of the dry Metanol in 15 times its own weight of water or nickel solution at a temperature of 160 to 180 degrees F. Practice has shown that the required weight of Metanol can be added to a hot nickel solution in dry form and then the entire nickel solution may be heated to 160 to 180 degrees F. Of course such a procedure involves a loss of time due to the heating and cooling of the solution, but the tank can be treated and then allowed to stand overnight to cool. Thus the lost time can be reduced to a minimum. In fact, it is almost necessary to allow the nickel tank to stand overnight after the Metanol is added.

When the Metanol is added to the solution, a foam forms on the surface. This foam usually disappears in about two hours, but since this delay represents lost time, it is best to add the Metanol in the evening and allow the tank to stand overnight before it is used.

Effect of Metanol on the Nickel Deposit

In addition to the prevention of pitting in the nickel deposit, Metanol affects the plate in other ways. The use of Metanol in a nickel solution produces a plate which is somewhat whiter and brighter than the conventional deposit. The deposit is also softer, finer-grained and somewhat easier to buff. Current densities slightly higher than those used for ordinary hot nickel solutions may be used without loss of ductility in the deposit. The nickel deposit can be chromium plated in the usual way without any special surface treatment other than cleaning.

Mechanism of Pit Prevention

Pits are formed when bubbles of hydrogen, oxygen, or air deposit on the surface being plated and prevent further deposition at that point. This condition is aggravated when the solution is dirty, because the dirt particles provide nuclei around which gas bubbles can form. The dirt particles themselves may deposit on the plate and cause a rough surface. The force holding gas bubbles (and sometimes dirt particles) to the metallic surface is called "interfacial tension." A force called the "solution hydrostatic pressure" is continually trying to force such bubbles to the surface of the solution. Of course when the interfacial tension is greater than the solution hydrostatic pressure, the gas bubbles continue to adhere to the plating surface and cause pits. If the interfacial tension can be reduced sufficiently, the solution hydrostatic pressure will immediately force gas bubbles to the surface of the solution. In fact this action will take place almost before the bubbles are formed and pitting will be prevented. Metanol is one of a number of addition agents that reduces the interfacial tension about 50 per cent, the exact reduction depending upon the Metanol concentration. The more Metanol that is present, the more radical will be the reduction of the interfacial tension. Thus Metanol prevents almost entirely the adherence of gas bubbles and dirt particles to the metallic surface being plated. The action of Metanol in lowering the interfacial tension is called "wetting", and the chemical producing that effect is called a "wetting agent."

Control of Metanol Concentration

Once Metanol has been added to a nickel solution, further additions need be made only to replace dragout loss. The Metanol is chemically stable so it does not decompose or decrease in effectiveness through electrical or chemical action. The Metanol con-

centration may be determined in three ways. The first way is the so-called visual method of solution control. Merely by observation of the finished plate from time to time, the operator can determine roughly when he needs to make a slight addition of Metanol. This method is very inaccurate and not at all trustworthy. The second method is an estimation, but it is sufficiently accurate for the purpose. Since the only loss of Metanol is by dragout, the loss in Metanol can be estimated by measuring the loss in other ingredients which do not decompose or plate out of the solution. Such ingredients are boric acid or chloride. The solution can be analyzed for boric acid or chloride, or both, when the Metanol is first added and its concentration is known. Then, at intervals, the boric acid and chloride content can be checked and the per cent decrease in the concentration of either can be noted. Assuming that the dragout of Metanol was in proportion to the dragout of the other ingredients, it can be assumed that there has been the same percentage decrease in the Metanol concentration. The actual Metanol concentration and the necessary addition to restore the original concentration can then be calculated quickly. The third method is really simpler and more accurate than the one just discussed, but it involves the use of a special apparatus known as a stalagmometer. This device measures surface tension by the "drop weight" method. Since surface tension and interfacial tension are parallel characteristics of the same solution, a change of surface tension will indicate a change in interfacial tension and a change in Metanol concentration. Hence, a definite value of Metanol concentration can be assigned to a certain value of surface tension for a given solution, and the Metanol concentration can thus be determined directly at any time. A stalagmometer is essentially a glass capillary tube having a bore of 0.5 mm. or less, connected to a glass bulb of some sort so that a definite volume of liquid can be run through the capillary tube and the number of drops counted as they drop out of the capillary tube. The number of drops of nickel solution are compared to the number of drops of distilled water of the same volume (at the same temperature), and the surface tension is calculated by means of the formula:

SURFACE TENSION equals Surface Tension of distilled water X number of drops of water X density of nickel solution divided by number of drops of nickel solution.

The density can be measured by a hydrometer. A table of surface tensions compared with Metanol additions necessary to restore the Metanol concentration to its proper value has been prepared. Thus the control man can measure the surface tension of the nickel solution and determine the Metanol addition necessary to keep the solution operating properly.

Limitations and Disadvantages of Metanol

For some classes of work and in some solutions Metanol is not sufficient in itself. After the recommended quantity of Metanol has been added to the nickel solution, small quantities of hydrogen peroxide must be added from time to time — usually about twice a week — to prevent pitting entirely. Another disadvantage in the use of Metanol is that it must be used with great care. If, for some reason, the Metanol concentration is built up too high, pitting develops on the face of the work together with bare spots. For simple hot nickel solutions it is better practice to add hydrogen peroxide occasionally rather than depend entirely upon Metanol. If Metanol is

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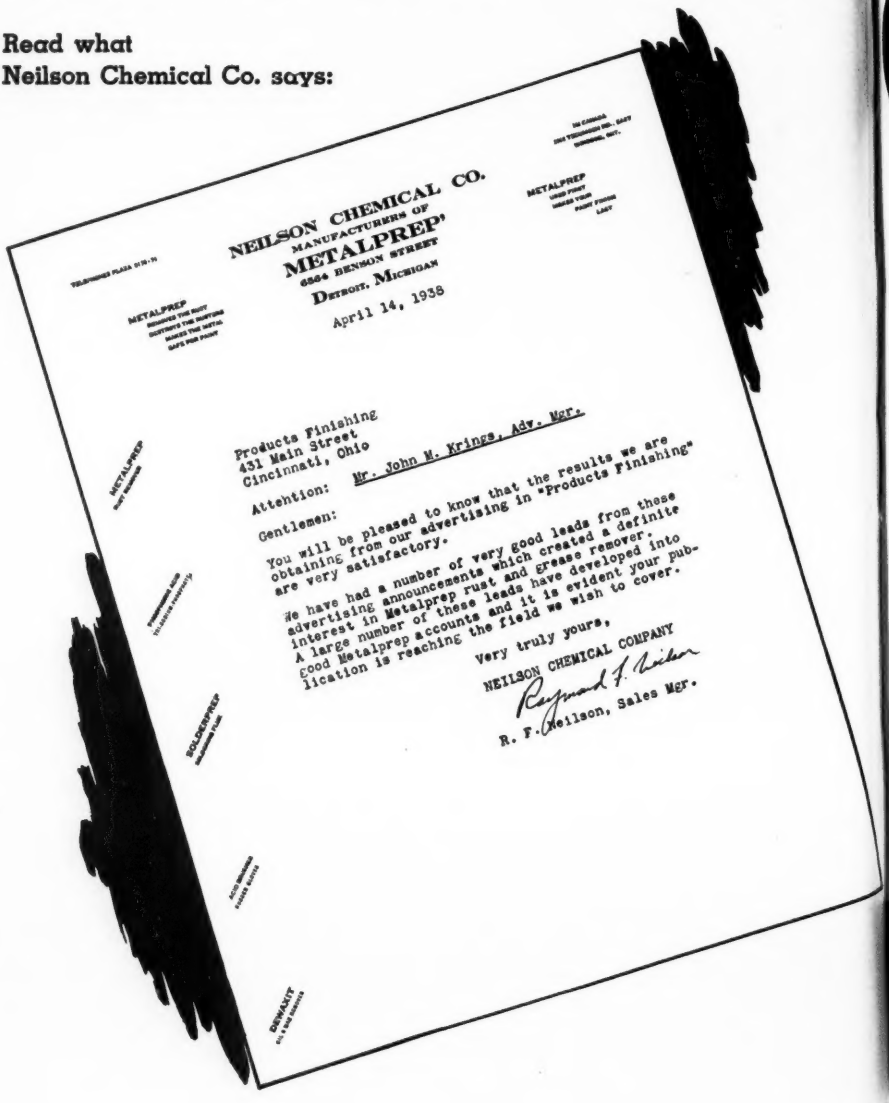

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added every time pitting appears on the work there is danger that the pitting caused by excess Metanol will develop and the difficulty will never be surmounted. This is particularly true in cases where no surface tension measurements can be obtained. As a matter of fact, surface tension measurements, while desirable, are not really essential. The operator can control pitting very well by small additions of Metanol at infrequent intervals and small additions of hydrogen peroxide as intermediate treatments. By this means the ductility of the nickel deposit can be maintained. If the current density remains constant, a decrease in ductility would indicate that an addition of Metanol was in order. If pitting occurred on a ductile deposit, hydrogen peroxide could be used. Thus the use of Metanol and other similar "wetting agents" presents a definite advance in the control of pitting in nickel solutions.

"Pick Up and Take". This is the title of a 4-page folder describing and illustrating Cleveland Tramrail Overhead Materials Handling Systems now being issued by the Cleveland Tramrail Division, The Cleveland Crane & Engineering Co., Wickliffe, Ohio. Photos included in the folder illustrate the numerous applications of Cleveland Tramrail in warehousing of stock. These installations are said to definitely employ the ideas of "making the original lift and carrying operation complete". There is also included in this folder an illustration showing rolls of material just off the truck as they have rolled into the warehouse and in the background in this same illustration the "grab" on the way up with its roll of material. Copies of this bulletin will be sent free upon request.

"DeVilbiss Spray-Painting & Finishing System". This is the title of a 28-page catalog covering the complete line of industrial spray-painting and finishing equipment manufactured by The DeVilbiss Company, 300 Phillips Ave., Toledo, Ohio. The new catalog covers, in condensed form, DeVilbiss spray-guns, feed tanks and equipment, special containers, air and fluid hose and connections, spray booths and exhaust systems, air compressing outfits and other DeVilbiss spray finishing equipment for industrial use.

Full specifications on all standard items in the DeVilbiss line are given. All improvements and additions recently made on the company's products are included.

DeVilbiss paint circulating systems and special and automatic equipment designed, built and installed to meet particular finishing or production conditions, are described and illustrated. Copy free upon request.

"Gehnrich Gas Fired Ovens and Air Heaters Bulletin No. 106". This is the title of a well illustrated bulletin describing Gas Fired Ovens and Air Heaters for industrial baking and drying which is now being issued by The Gehnrich Corporation, Skillman Ave. and 35th St., Long Island City, New York. Such subjects as Indirect Radiator Systems with Heat Circulation, Direct Internal Heating with Circulation, Integral Convection Heating, External Convection Heating, and so on are very well described in this bulletin.

Gehnrich Gas Ovens are said to embody every construction feature designed for high operating efficiency, low maintenance, long life and reclaimability for changing operating conditions. Copy free upon request.

Webster Series "78" Thermostatic Traps Catalog 1200 CP is the title of one of the most complete summaries ever to be published for the users of process steam by Warren Webster & Company, Camden, New Jersey. This 32-page catalog is well illustrated with views of installations and data charts.

Webster Series "78" Thermostatic Traps when installed in accordance with the recommendations of Webster Service, provide automatic, quick and complete discharge of air and water of condensation from process-steam-using equipment. While intended primarily for steam pressures above 10 lbs., Webster Series "78" Traps will work equally well at low pressures, although, of course, the capacity will decrease with the pressure.

Other important features such as design and construction, sizes and types are also described in Catalog 1200 CP, a copy of which will be sent free upon request.

Haveg Standard Cylindrical Tanks, Covers and Outlets Bulletin

This bulletin is now being issued by Haveg Corporation, Newark, Delaware, and gives complete technical data on standardized cylindrical tanks. Included

Haveg Standard Cylindrical Tanks, Covers and Outlets Bulletin

in the bulletin is a table containing design data for standard Haveg tanks at atmospheric pressure with full head of liquid. The tanks can be made in the diameters listed to any depth required, up to the maximum given in the table. The wall and bottom thickness, reenforcement data and other design data on the cylindrical Haveg tanks are also given in the table.

Haveg tanks should be fully supported on the bottom. They are usually installed on a simple continuous concrete or wood base. A wooden platform is satisfactory except where excessive moisture or acid conditions might cause serious swelling or warping.

There are two general types of covers regularly used with Haveg tanks. These are the dished covers and flat covers. The type of cover to use for a given installation and the method of fastening it to the tank will depend upon the intended service.

Up to and including the 16 in. size, flat covers are recommended for all applications. For the larger sizes dished covers should be selected for all applications involving severe mechanical conditions. Such applications would include all jobs intended to be gas-tight, as well as cases where men must walk over the top of the tank, where fume duct must be supported, and so on. Flat covers in the larger sizes are generally restricted to those applications where headroom is limited or mechanical conditions are not severe.

Copy of bulletin describing standard cylindrical tanks, covers, and outlets will be sent free upon request.

Benjamin Catalog No. 26

This is the title of a 352 page, loose leaf book which includes data on the latest improvements and lighting developments. This catalog is being distributed by Benjamin Electric Mfg. Co., Des Plaines, Illinois.

Catalog 26 is a veritable encyclopedia of industrial lighting, flood lighting and signals—packed full of vital information, dealing with illumination problems of every conceivable type. In addition to supplying complete commercial data on the Benjamin line, this catalog thoroughly describes a vast number of specifications, engineering requirements, floor layout plans, intensity formulae, cost and labor saving hints, lighting efficiency curves and installation illustrations.

Benjamin Catalog No. 26 presents in concise, semi-technical form information gleaned from years of assiduous research and application in the lighting field. Sectionalized and efficiently cross in-

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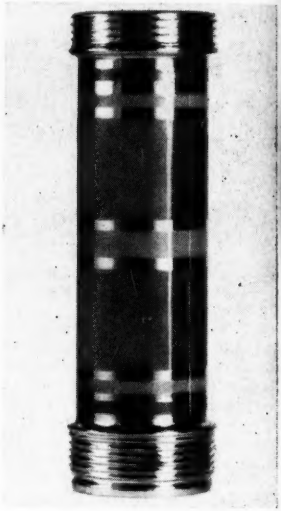
(Right)—Banding with baked synthetic enamels can be economically handled for large quantity production of a product such as the chromium and nickel plated flashlight shell illustrated herewith. The color and design of the finish can be easily varied.



(Photo Courtesy Patent Button Co.)

(Below)—All extruding parts such as pipes, motors, pumps and structural members are hidden from view on this industrial washing machine and only clean, smooth painted outside surfaces proportioned in accord with the best thought in modern machine design present themselves.

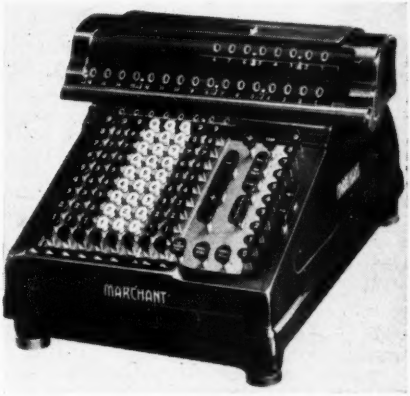
(Photo Courtesy International Conveyor and Washer Corp.)

(Photo Courtesy The Porcelain Enamel & Mfg. Co., and The American Enameler)

(Above)—Approximately 18,000 square feet of porcelain enameled Macotta, fused on Armco enameling iron, was used in this largest installation of architectural porcelain enamel.

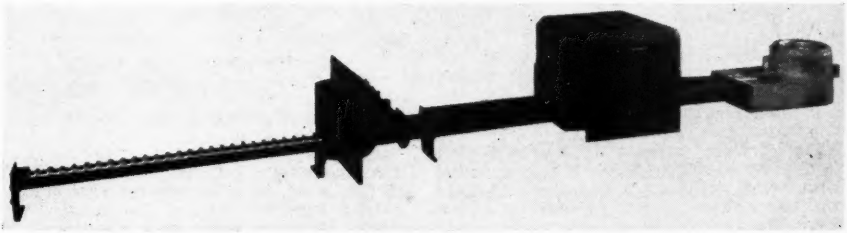
(Right)—The finish on this Silent Speed calculator is known as "Marchant green", a color extremely restful to the eyes of the operator.

(Below)—The stoker shown herewith is attractively finished with a wrinkled. cadet gray spray finish which is baked on at a temperature of 300 degrees.



(Photo Courtesy Marchant Calculating Machine Co.)

(Photo Courtesy Conco-Sampsel Stoker Corporation)



NEWS OF THE INDUSTRY

Frederick Gumm Chemical Company Appointed Distributors For Lionite Abrasive Polishing Grains

According to a recent announcement issued by General Abrasive Company, Inc., 3508 Hyde Park Blvd., Niagara Falls, N. Y., the Frederick Gumm Chemical Company, Inc., 538 Forest St., Kearney, N. J., has been appointed distributor for Lionite polishing grains in New York and New Jersey.

McGean Obtains Bright Nickel Plating Patents

Of considerable interest to the plating trade is an announcement of the issuance of two recent patents to The McGean Chemical Company, Republic Bldg., 25 Prospect Ave., N. W., Cleveland, Ohio. These patents relate to Bright Nickel Plating and are U. S. Patent No. 2,112,818 issued March 29, 1938, and U. S. Patent No. 2,114,006 issued April 12, 1938, on applications of Virgil H. Waite.

Mr. Waite is Director of Research for The McGean Chemical Company, which occupies a prominent position in the electroplating industry as manufacturers of anodes and chemicals.

The McGean process of Bright Nickel Plating is said to have been in successful commercial use on a substantial scale for over three years, particularly on automotive parts.

Eighth Annual Meeting of Porcelain Enamel Institute To Be Held in Cleveland

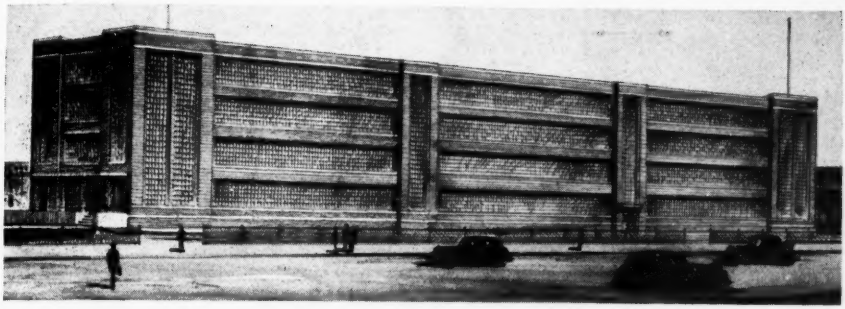
At the meeting of the Executive Committee of the Porcelain Enamel Institute held in Cleveland, April 12, 1938, it was decided to hold the Eighth Annual Meeting of the Porcelain Enamel Institute in Cleveland, October 25 and 26.

This meeting will be of wide interest to the manufacturers of sheet steel, and chemicals for use in the manufacture of enamel, as well as to the various makers of enameled products in the country. Due to the rapid increase in the use of porcelain enamel as an exterior finish for buildings, the discussion of its use in architecture will take a prominent place in the program.

Cleveland was selected as the place for this meeting due to its central location. It is only an over-night trip for practically every enameling plant in the United States, excepting the West Coast group. Preparations are being made for an extensive program which will be of interest to all concerns connected with the manufacture of porcelain enamel.

Norton Company Announces Erection of New Office Building

A four-story building, 330 feet long, 60 feet wide, is to be erected in the very near future by Norton Company, Worcester, Massachusetts. This building is to



The Proposed New Four-Story Building of the Norton Company

replace Plant One and the old office building. The total floor area will cover 100,000 square feet. The floors are designed to carry a live load of 250 pounds per square foot. The structure of steel and brick will cost approximately $263,000. This is the second step in a renovation and replacement program which began in 1937.

Wheelco Instruments Company Appoints Three New Representatives

Wheelco Instruments Company, 1933 Halsted St., Chicago, Ill., has recently announced the appointment of three new representatives to handle the sales and service of Wheelco temperature control, indicating and safety instruments. The appointments have been made as follows: Mr. C. I. Gillen, 5026 Osage Ave., Philadelphia, Pa.; Mr. H. F. Rehling, 993 South St., Boston, Mass.; and Mr. R. W. Coward, 2400 Arlington Ave., S., Birmingham, Alabama.

Signal Electric Mfg. Company Occupies New Addition

The Signal Electric Mfg. Company, Menominee, Mich., has just announced its occupancy of a new addition to its present factory. The addition consists of a two-story brick building, providing 22,500 additional more square feet of floor space. The addition enables Signal Mfg. Company to increase its storage and production facilities. This addition is the second building addition in two years that this company has made, due to increased demand for fractional horse power motors, electric fans, portable drills, bells and buzzers.

H. V. Walker Co. Announces the Appointment of Technical Director

H. V. Walker Co., Elizabeth, N. J., takes pleasure in announcing that Mr. I. T. Darlington has joined the company as technical director. Mr. Darlington has been directly connected with the development and sales of lacquer materials for the past 20 years.

Mr. C. F. Gross who has been a sales representative in eastern Pennsylvania and greater New York for a prominent lacquer manufacturing company for the past fifteen years has also joined the company as sales manager.

Hendrickson Appointed Manager of Crane Oil Sales Service

Mr. R. A. Hendrickson, who has been in the employ of Crane Co., Chicago, Ill., for 20 years, has been appointed manager of the Oil Sales Section by W. H. Pape, manager of the Valve and Fitting Department.

For many years Mr. Hendrickson had charge of the design of steel products to meet the developing conditions of increasing pressures and temperatures, particularly in the oil industry. Supplementing this, Mr. Hendrickson has been a special engineer in the oil sales section for the last three years, working principally on the solution of problems in this field.

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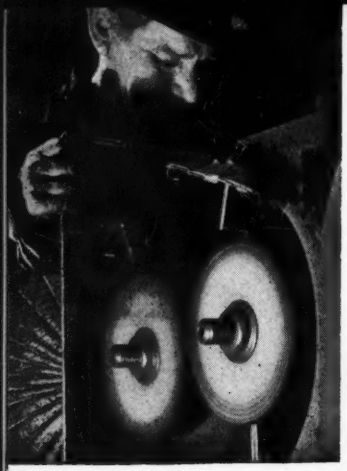


NEW
Plant Equipment & Materials

Paasche Portable Automatic Wax Coating Machine

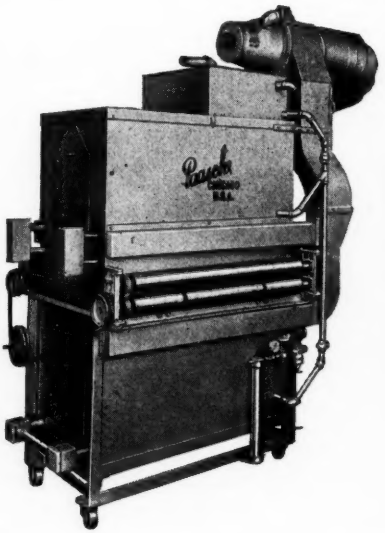
The illustration herewith shows a Portable Automatic Wax Coating Machine which was recently placed on the market by Paasche Airbrush Company, 1910 Diversey Parkway, Chicago, Ill., for the purpose of protecting a lithographed finish on sheet metal to be formed where it is necessary to lubricate the sheet or die. The Paasche Automatic Wax Coating Unit applies a barely discernible fine mist coat of paraffin. By means of the machine the coating of paraffin can be applied absolutely uniform over the entire sheet at exactly the right temperature.

Operated at average speed, approximately 75 sheets (size 36 in. x 29 in.) can be coated per minute on both sides.

The Paasche Portable Automatic Coating Machine shown in the illustration is approximately 2 ft. 5 in. long x 5 ft. 1 in. wide x 7 ft. high with rubber and steel loading and unloading rolls. The unit is also equipped with an adjustable spring tension roll bearing solenoid airvalve and limit switch. An electric motor drive is used at 440 volts, 3 phase, 60 cycles to operate at speeds when the production is 75 sheets per minute. The structural steel frame is electrically welded and mounted on rubber casters.

The material reservoir of this machine is constructed of galvanized sheet metal supported by angle iron electrically welded and insulated with rock wool. The reservoir is equipped with electric strip heaters, 440 volts, 3 phase, 60 cycle. These heaters are thermostatically controlled to maintain temperatures up to 180 deg. F. A material circulating pump and pressure gage are also provided.

Four automatic airbrushes with asbes-



Paasche Portable Automatic Wax Coating Machine

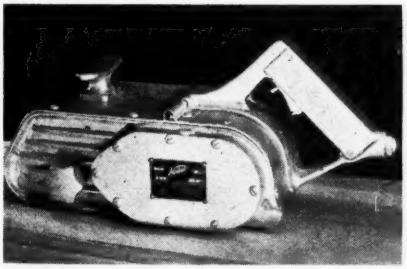
tos packing and universal mountings, together with hose and fittings, are also provided. The unit is also equipped with an air conditioning unit with air regulator, gage and fittings. Included in the complete unit is a fully enclosed and fireproof ventilating unit with spray housing, ventilator duct and removable baffle plates.

Nedco Sanding and Polishing Machines

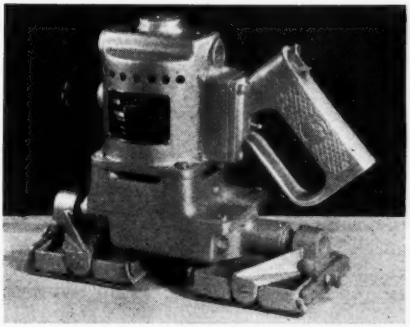
The Belt Sander and Oscillating Sanding and Polishing Machine shown in the illustrations herewith have been recently placed on the market by the Nedco Company, 87 Rumford Ave., Waltham, Massachusetts.

The Oscillating Machine was developed to meet the demand for an electrically driven tool for use where it is necessary to sand or rub workpieces in a straight line. The pads on this machine operate in opposite directions at all times and since the tool is well balanced, there is no tendency for the machine to move away from the operator. There is practically no vibration from the main body of the machine so that the operator does not become fatigued from holding the tool or from guiding it along the work.

Either ordinary sandpaper, abrasive cloth, rubbing felt or lamb's wool can be used on the pads, the material being held on by a simple clamping device. In using sandpaper or abrasive cloth, several layers can be held on at one time so that the pieces can be torn off as they become worn without stopping to reload the pad. The machine itself is so designed that there are but few moving parts and such parts are of heavy construction so that long life is assured.



Nedco Belt Sander



Nedco Oscillating Sanding and Polishing Machine

Ball bearings are used throughout and the gears are of heat-treated steel with helical teeth. The motor is of the universal type, ½ H.P., and furnished for either 110 or 220 volts. The complete unit weighs but 15 pounds. The stroke is 5/8 in. on each pad, with a possible 2,500 strokes per minute. The sanding or rubbing pads are 4 in. x 4 in. and require

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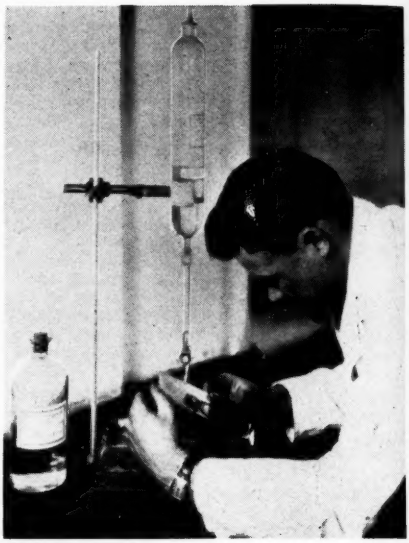
one-quarter of a standard sheet of sandpaper.

The Belt Sander illustrated herewith is of a very compact and novel design, giving balance and ease of control. The Belt Sander uses a 5 in. belt which is arranged to sand right up to the outside edge. The belt is driven by ½ H.P. motor through helical spur gears running in oil. The driving pulley is 4 in. in diameter and surfaced with rubber so that a maximum driving effort is obtained. The belt speed is 1,400 ft. per minute and the belt tension is automatically controlled by means of an idle pulley. Oversize ball bearings of the grease seal type are used throughout. The motor is available for either 110 or 220 volts. The complete machine weighs 20 pounds. The handles of the machine are so arranged that the machine can be placed bottom side up on a bench and used as a stationary sanding machine.

H-V W-M Dropping Test Set for Zinc Coatings

The Zinc Dropping Test Set manufactured by the Hanson-Van Winkle-Munning Co., Matawan, N. J., can be used for determining the thickness of electroplated zinc coatings by the Hull & Strausser method. This method is simple, requiring only a few minutes to make a determination and the readings are sufficiently accurate for control purposes. The test set consists of a reservoir which is filled with the proper test solution and two stopcocks that are provided which should remain open until all air is displaced in the delivery tube. Leaving the lower stopcock in the open position, the upper stopcock is adjusted so that approximately 100 drops per minute issue from the burette. With the upper stopcock remaining in this position, the flow is stopped by the lower stopcock.



H-V W-M Dropping Test Set for Zinc Coatings.

The specimen to be tested should be cleaned by rubbing with a cloth moistened with trichlorethylene and placed 2 or 3 inches below the capillary tip at an angle of 45 deg. from horizontal. The lower stopcock is opened and the solution allowed to drop on the specimen. The period required from the time the first drop touches the plate until the bare metal is exposed is measured with a stopwatch or the second hand of a pocket watch. Each second elapsing during the test represents a thickness of deposit of 0.00001 inch. For example, if the base metal appears after 22 seconds of dropping of the solution, the thickness of the deposit is 0.00022 inch.

After the test is completed, the lower stopcock can be closed and the glass stopper placed in the burette. The solution in the glass tray is discarded as it is advisable to make a single test only each time. If stripped work is to be replaced, it is advisable to rinse it quickly after the test and replate as usual. The dropping rate should be checked after several tests. The drop test method for zinc coatings is said to give an accuracy of within 10 per cent of the actual thickness of the deposits.

SEVERANCE MIDGET MILLING CUTTERS
Large stock of Standard cutters. Any shape, any size—custom made for burring, countersinking, taper-reaming, tube burring and facing, ball socket reaming, trepanning, etc. Submit your problem to our engineers. CATALOGUE ON REQUEST.
Severance Tool Mfg. Co.
1518 E. Genesee Ave., Saginaw, Michigan

Ballou Gold Paste

The Edward C. Ballou Company, Inc., 259 West 14th St., New York, N. Y., is said to have perfected a Gold Paste which improves the leafing qualities and brilliancy of bronze powder. Ballou Gold Paste disperses easily in the varnish or lacquer in which it is used, consequently a minimum of time is expended in mixing.

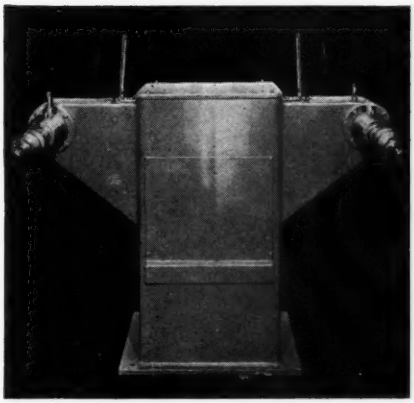
Ballou Gold Paste does not fly and cause the unpleasantness which is frequently objected to by users of bronze powders. It is said to produce a smooth and brilliant finish used in conjunction with varnish type vehicles.

Crown Double Arbor Polishing Lathe

The Double Arbor Polishing Lathe illustrated herewith has been placed on the market by the Crown Rheostat & Supply Co., 1910 Maypole Ave., Chicago, Illinois. This machine is a double face machine having two spindles, each spindle driven by an independent motor through a V-belt drive. Four men can be accommodated at this machine and it is also said to permit the greatest number of men to work in the smallest amount of floor space.

The Crown Double Arbor Polishing Lathe is equipped with two 3 h.p. motors and the floor space required for the complete unit is 48 in. x 55 inches. The distance between the centers of the two spindles of the unit is 48 inches. The distance between the centers of the two spindles increases slightly on a machine which is equipped with a 5 or 7½ h.p. motor. The spindles are overhung 13 in. from the base of the machine.

The motors of the Crown Double Arbor Polishing Lathe can be serviced either through the top or through two side doors provided on the machine.



Crown Double Arbor Polishing Lathe

The speed of the machine can be changed by merely changing the motor pulley. The spindles are mounted on ball bearings running in oil.

The unit illustrated herewith weighs approximately 1500 pounds.

Sisalin Sections

Sisalin Sections with external appearance similar to that of a cotton buff section for use in removing many minor imperfections or die marks from the base metal have been placed on the market by Hanson-Van Winkle-Munning Company, Matawan, New Jersey. Sisal is a tough fibre used in the manufacture of rope and binder twine. The Sisal used in the Sisalin Sections is prepared in a special mat form. It is interleaved with alternate layers of muslin and the resultant product is then bound together by various types of sewing.

The Sisalin Section is especially effec-

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Metalprep Metal Cleaning Processes are your insurance against field complaints which develop as a result of inadequate cleaning and preparation of metal surfaces for the prime lacquer or enamel coats. Metalprep makes the metal safe for paint.

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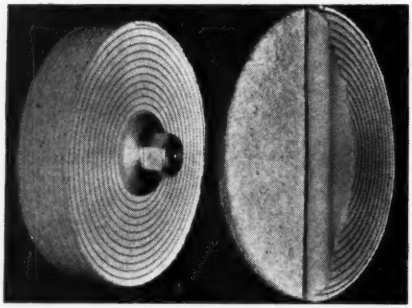
NEILSON CHEMICAL CO.

6564 BENSON ST., DETROIT, MICH. TECUMSEH RD., WINDSOR, CANADA



Sisalin Sections

tive in removing the minor imperfections when used as an intermediate operation between polishing and buffing.

Sisalin Sections are recommended for carbon steel, stainless steel, brass, copper, and aluminum. The composition to use with the section varies with the type of metal and finish to be produced. Generally, compounds are limited to tripoli, stainless steel rouge, and emery paste. Considerable composition savings are said to be effected by the use of Sisalin Sections since the composition is excellently retained between the strands of the Sisal. When a comparatively high finish is desired, compositions of dry type can be used.

Sherwin-Williams Opex and Kem Refrigerator Refinishing Enamels

To meet a rapidly increasing demand for a refrigerator refinishing enamel that is equal to the original finish in appearance and resistance to abuse, the Sherwin-Williams Co., 101 Prospect Ave., N. W., Cleveland, Ohio, has placed on the market four refrigerator refinishing enamels of the Opex and Kem Types. Opex is a lacquer type refrigerator enamel and is designed by the numbers 30576 and 30577. The No. 30576 approximates the shade of a new refrigerator and the No. 30577 approximates the shade of an old or bleached box. By intermixing the two together, any intermediate shade is said to be possible.

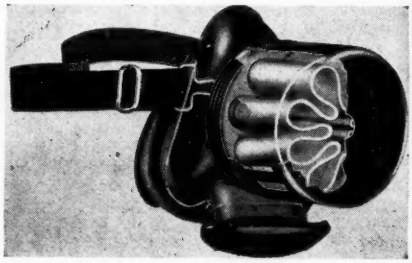
The Kem enamel is a synthetic type and is also obtainable in two different shades. The Kem type is said to provide maximum color stability, humidity and grease resistance. The drying time is slightly longer than the Opex line.

Opex refrigerator enamel is said to take 100 to 120 per cent reduction with Opex Thinner No. 10 for spraying. Retarder Thinner No. 04861 is recommended for a final coat in order to insure maximum flow.

The recommended reduction for the Kem line is 10 to 20 per cent with Kem Reducer No. 75 for spraying. Two or more coats are said to give an exceptionally lustrous and brilliant finish.

Willson Rotiform Respirator

A light weight, comfortable and compact respirator to be known as the "Willson Rotiform Respirator" has been recently placed on the market by Willson Products, Inc., 271 Thorn St., Reading, Pennsylvania. The respirator is approved by the United States Bureau of Mines for protection against Type "A"



Willson Rotiform Respirator

dusts such as silica quartz, asbestos, aluminum, iron ores, and so on that are produced in the process of grinding.

A long life "Rotiform" felt filter is so designed that an effective filtering surface of more than 30 sq. in. is confined in a relatively small area. This is said to produce adequate filtering efficiency

Borolon
TRADE MARK
Strictly first-quality aluminum oxide abrasive polishing grain manufactured in our own electric furnace plant under highest standards of quality and uniformity. Write for samples.
ABRASIVE COMPANY
Grinding Wheel and Abrasive Division of Simonds Saw and Steel Co., TACONY and FRALEY STS., PHILADELPHIA, PA.

combined with low breathing resistance. The construction is such that the Rotiform felt filter should last indefinitely before replacement is necessary. The only wear that is encountered would occur when the filter is removed from the respirator for cleaning. When clogged with collected dust to the point that breathing resistance is increased, the filter can be easily cleaned by introducing a jet of compressed air into the core.

A metal cover cap protects the filter from contact with the wearer's hands thus keeping it clean of surface dirt, grease, oil, and so on. Spectacles or safety goggles can be worn readily with this respirator.

Glasak Anode Bags

A new type of anode filter bag, made entirely of glass, has just been placed on the market by Munning & Munning Inc., 202 Emmett St., Newark, New Jersey. The Glasak Anode Filter Bag is made from finely spun glass cloth. The fabric is woven into coarse squares which help to retain the finely divided particles and at the same time offer the advantage of high porosity. The anode bags are available either double lap-seamed lengthwise or woven seamless. Since the bags are securely sewed at the bottom with glass thread and hemmed at the top, for insertion of glass cord, glass is the only material used in their construction.

Glasak Anode Bags

Insolubles are prevented from entering the plating solution when the Glasak Anode Bag is used. The bag can be used repeatedly and it can be used in either acid or alkaline solutions within the temperature range of any plating solution. Glasak Anode Bags are resistant to attacks from chemicals with the exception of hydrofluoric acid or caustic solutions.

The fabric of Glasak Bags is said to have maximum strength, due to the fact that the bags are woven from staple length strong and pliant individual fibres which do not deteriorate on wetting and are not absorptive. Glasak Anode Bags do not swell or cause the fabric of the fibre to clog.

Special One-Dip Detrex Degreaser

The completely automatic degreasing machine illustrated—designated as a Special One-Dip, Model 1-DC-700 Detrex Degreaser—has been developed by the Detroit Rex Products Company, 13017 Hillview Ave., Detroit, Mich., especially for cleaning small, intricate-shaped radio tube parts prior to inspection and assembly.

The unit is designed for loading and unloading at opposite ends. The conveyor is similar to a continuous belt type conveyor, consisting of a series of closely spaced cross-rods. It returns beneath the machine to the loading station.

Work is handled in small, perforated-bottom trays which are semi-automati-

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COOPLAC No. 82
- Will not crack, curl or become tacky.
- Adds durability and distinctiveness to your product.
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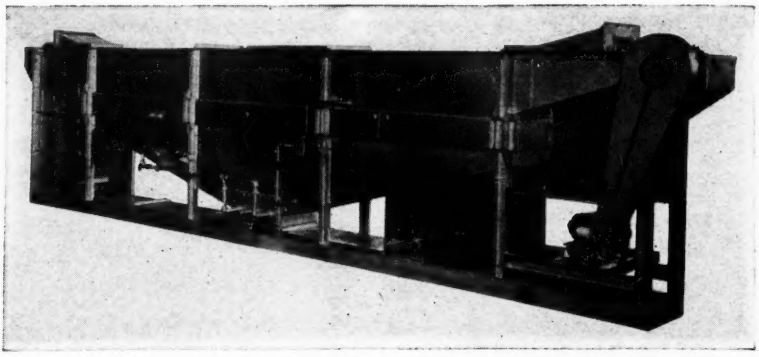


Special One-Dip Model 1-DC-700 Detrex Degreaser

cally fed onto the conveying belt. These trays are then lowered through the vapor zone where the work is thoroughly wetted by hot solvent vapors condensing on the cool metal parts. As the work progresses through the degreaser, it is immersed in boiling solvent, insuring complete removal of oil and grease and any solid particles which may have adhered to the surface of the parts. Drying is effected by again bringing the work up through the vapor zone to the unloading station. The work emerges from the degreaser clean, warm, and dry ready for inspection and assembly. The entire cycle of cleaning operations is accomplished in less than three minutes.

Steam coils, for heating the solvent, are welded to removable clean-out doors. Although steam is used for heating this particular unit, models are available which employ gas, electric immersion heaters, or process steam boilers as a heat source. A control system consisting of a vapor-actuated thermostat (temperature indicating) and an air-operated valve is used to regulate the heat input. The bulb of the thermostat is placed in the machine at a suitable elevation to control the height of the solvent vapors and to insure general economy of operation.

A water jacket condenser and a solvent collecting trough completely encircle the machine. The solvent vapors, which condense at the level of the water jacket, collect in the trough and are returned to the boiling sump by means of a solvent run-back line containing a solvent vapor trap and a water separator.

The degreaser is equipped with a Model S-50 Detrex Solvent Still for reclaiming contaminated solvent. The still is capable of distilling the entire solvent content of the machine in approximately one hour, thus insuring an immediately available supply of clean solvent distillate for operating purposes.

At a normal conveyor speed of 7 ft. per minute, the rated production capacity of this unit (with single line of trays) is 720 trays per hour, each tray containing approximately 24 pieces of work. The approximate overall dimensions of the degreaser are: length, 27 ft. 7 in.; width, 3 ft.; height, 6 ft. 2 inches.

Divine Brothers V-Belt Driven Lathe

Divine Brothers Company, Utica, N. Y., has announced the addition of a completely newly engineered V-Belt Driven Lathe to their extensive line of standard and special polishing and buffing lathes.

For a real good polishing job use

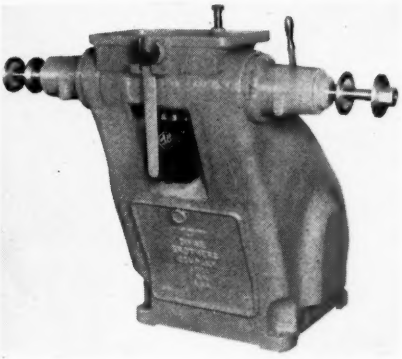
KEYSTONE EMERY

Write for Sample

KEYSTONE EMERY MILLS **4316 Paul St., Phila., Pa.**

This lathe is said to be precision built, of compact design with particular attention given to smoothness of operation at high running speeds and freedom from projections which might interfere with the operator or work holding devices.

The V-Belt Driven Lathe is available in four sizes: 3, 5, 7½ and 10 H.P. with continuous duty N.E.M.A. Standard Motor. The spindle speeds range from 1800 to 3600 R.P.M. Ball bearings are of oversize capacity with oil reservoir lubrication.



Divine Brothers V-Belt Driven Lathe

The Divine Brothers V-Belt Driven Lathe is equipped with a flush base, recessed floor bolts and starter box. A 12-inch overhang, flush screws and combination start-stop-and-brake lever are said to contribute to the reduction of hazards and flexibility of use. A new and simple means of changing V-belts is provided which does not require removing the spindle or disturbing the spindle bearings.

In addition to the saving of time, the simple means of changing the belt is said to overcome the expense and difficulty of realigning and readjusting bearings if belt changes become necessary. The manufacturers state that the entire change can be made within ten minutes.

The base is a single heavy wall casting. Belt adjustment can be made by means of an external handwheel which is located at the rear of the pedestal. Added refinements of this machine are a positive spindle lock, large cast composition and tool tray and a convenient wrench hook.

Seymour Bright Nickel

The Seymour Manufacturing Company, 75 Franklin St., Seymour, Conn., has placed on the market a process whereby bright nickel plate can be obtained from standard baths by means of certain addition agents. This process is said to produce a brilliant plate of nickel which is soft and ductile, requires minimum of control and is characterized by freedom from pitting and ease of operation. Seymour Bright Nickel may be deposited on steel, either directly or over copper plate, on brass or other non-ferrous alloys and on zinc base alloys which have been previously copper plated or dull nickel plated. No special preparation of the base metal is necessary other than a suitable high finish. Seymour Bright Nickel is not passive and can be chromium plated without activation or color buffing and the nickel does not tarnish readily.

This Seymour solution is stable, has good throwing power and produces a bright plate at all thicknesses of deposit. No agitation or circulation of the solution is required and the process is applicable to still or automatic tanks.

Accurate control methods are available

MAGIC TACK RAGS remove specks, lint and sand particles--- bring out that deep, smooth luster, produce a faultless surface for white or colored finish. Why use "home made" tack rags when you can buy MAGIC TACK RAGS at trifling cost! They are tackier, do not dry--- are dust-proof and spontaneous combustion proof. Packed in dozen and gross lots or more. Made only by the

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to keep correct the concentration of ingredients in the bath. Due to its efficient operation and special Seycast anodes, the nickel content and the pH require little adjusting.

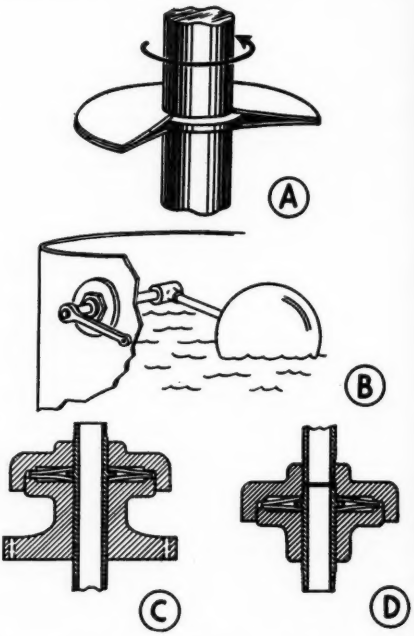
Seycast anodes have been developed with the Bright Nickel process and are designed for efficient operation in solutions having a pH lower than 4.5. These anodes corrode smoothly, form no heavy sludge nor any loose particles of nickel. The anode is cast and costs no more than any 99 per cent plus cast nickel anode.

The brightening ingredients for Seymour Bright Nickel are furnished as three solutions to be added to a Watts bath containing 37 ozs. per gallon nickel sulphate, 8 ozs. per gallon nickel chloride, and 5 ozs. per gallon boric acid. A volumetric method indicates the concentration of the brightener in the bath. A surface tension measurement by a stalagmometer indicates the need of the anti-pit and the maintenance solution is added only to replace the ingredients lost by drag-out.

The Seymour Bright Nickel bath is operated under the following conditions: temperature 110 to 120 deg. F., current density up to 40 amperes per square foot, pH 2 to 3 (electrometric), surface tension 32 to 37 dynes per centimeter. The tank must be rubber lined and Seycast anodes are recommended. The solution must be filtered when necessary but continuous filtration is not required. The Seymour Bright Nickel ingredients should be added only to a Watts solution of the composition given, the solution being made up new, purified and filtered. The use of ammonia or ammonia salts is not recommended and adjustments of pH should be made with sulphuric acid or nickel carbonate.

Marsh Packless Unit

A packless unit has been placed on the market by Jas. P. Marsh Corporation, 2073 Southport Ave., Chicago, Ill., for use in equipment where a shaft or pipe revolves or oscillates through the wall of a tank, pressure vessel or vat, and a seal must be maintained around a shaft or pipe. The packless unit can also be used for variants of this condition such as swivel pipes and similar devices.



(A)—Marsh packless unit with solid shaft showing basic construction. (B)—Marsh packless unit showing use as liquid level control or for operating levers, clutches, and so on in closed pressure vessels. (C)—Unit as supplied for flanged mounting. (D)—Unit as used for swivel pipe devices.

The basic principle of the unit is covered by the sectional illustration herewith. It consists of a shaft or tube on which is machined a collar **A**. Pressing up against the upper and lower faces of this collar are the stainless steel wafers **B** and **C**. Since the wafers are spring steel, they form a close, uniform contact around the faces of the shoulder when compressed together at their outer edges as shown in the diagram. This action forms a pressure seal that is said to be very effective.

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The packless unit is the outgrowth of another mechanism of basically similar design which has been used successfully for a number of years in Marsh packless valves. Among the uses to which the packless unit can be applied are as follows: a method for transmitting float movement to valves, switches, and so on; a method of operating levers, valves, and so on inside a vessel or vat from an external lever or system of levers; a method of providing a swivel pipe as in automobile washing, process work and similar uses; a pressure joint, stuffing box, or "steam fit" for light equipment with slowly rotating drums. The Marsh packless units are available as self-contained flanged assemblies and in a number of standard and special forms in a range of sizes.

Hilo Trans-Lux Metallic Colored Lacquer

A metallic colored lacquer designated as "Trans-Lux" has been placed on the market by Hilo Varnish Corporation, 42-60 Stewart Ave., Brooklyn, New York. Trans-Lux Metallic Colored Lacquer is a highly pigmented flexible lacquer and is said to be durable and will withstand normal outside exposure. Trans-Lux dries to a tough surface which has a pearly metallic sheen and lustre. This attractive decorative and protective coating may be used on any non-porous surface to which ordinary lacquers or enamels could be applied. Such items include automobile accessories, towel racks, toys, novelties, switch-plates, and so on. The smooth semi-lustrous finish need not be rubbed or polished and no protective coating of clear lacquer is required.

Trans-Lux Metallic Colored Lacquer is available in many colors. On metal surfaces such as steel, brass, tin, copper and polished aluminum, Trans-Lux Metallic Colored Lacquer adheres firmly. On nickel and chromium, however, better adhesion is obtained by first applying a coating of clear synthetic baking primer. On chromium and nickel, full body clear synthetic baking primer should be sprayed on and baked for one hour at 300 degrees F.

M & W Lacquer That Resists Rust Inhibitors

Maas and Waldstein Company, 438 Riverside Ave., Newark, N. J., has developed a special type of clear lacquer that can be used on equipment lubricated with lubricating oil containing rust-inhibiting substances. This lacquer is not discolored or otherwise affected by any of the commonly used rust inhibitors and it is also said to be resistant to humidity, salt spray, 10 per cent hydrochloric acid and other chemicals, as well as out-door exposure. It is tough, durable, and strongly adherent and will stand up well under stamping, forming, and other mechanical operations so that it is especially suited for use on nameplates. This lacquer can be applied to aluminum, brass, copper, and other metals by dipping and spraying and air dries rapidly.

J. J. Siefen Nuglu Abrasive Bond

An abrasive bond for setting-up polishing wheels, belts or disc, to be known as "Nuglu", has been placed on the market by J. J. Siefen Company, 1936 W. Lafayette Blvd., Detroit, Mich. Nuglu is said to work on all wheels including leather and sheepskin. A maximum of flexibility is said to be obtainable with the use of Nuglu. Wheels set-up with this bond will hold their shape or face. Nuglu can be used with both fine and

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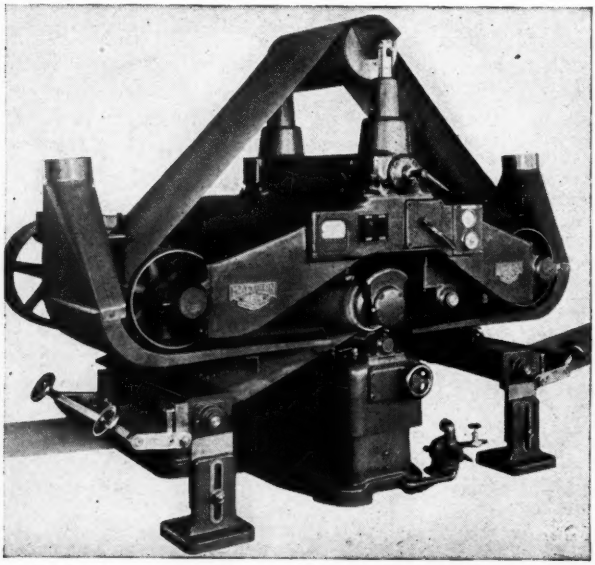
coarse grained abrasives for the finish or rough polishing of practically all metals. Since it is not affected by weather conditions, it will not thicken in the cans in which it comes ready for use. A minimum amount of abrasive grit per wheel is said to be necessary on Nuglu set-up wheels.

Mattison No. 464 Continuous Strip Grinder

The Mattison No. 464 Continuous Strip Grinder now being marketed by Mattison Machine Works, Rockford, Ill., is designed for grinding strip coil through the use of factory coated abrasive belts. For example: after hot rolled coils are pickled, annealed and cold reduced, strips that show any imperfections are ground on this machine. Also after each additional cold reducing operation, coils that will not pass inspection are ground before annealing and pickling.

Power driven reels are placed at each end of the machine from which the strip passes guiding rolls, and over the work support roll. Work support roll is air actuated with quick movement for disengaging the work from the belt. Ample movement is provided to allow extra room for passing the strip under the belt in loading. Grinding roll is cushioned and has adjustable grinding tension.

Belt is driven from both ends, so it can be run in either direction, according to direction the strip is traveling. The flexing of the strip as it passes over the support roll and the point contact of the grinding roll provide for fast-cutting belt action, and duplicates the action of the wide belt grinders on wide sheets. Made in widths for grinding 12 in., 18 in., 24 in. and 36 in. wide strips.



Mattison No. 464 Continuous Strip Grinder

Tripoli Remover

Metalwash Machinery Company, Inc., 119 East 24th St., New York, N. Y., has recently placed on the market a special type of washing machine to be known as a "Tripoli Remover". This machine was developed for the purpose of removing tripoli, rouge, and other buffing and polishing compounds from racked parts prior to plating in order to eliminate the necessity of hand soaking or scrubbing.

An alkali wash is provided in the Tripoli Remover. The unit is equipped with a variable speed conveyor so that a variety of washing speeds can be obtained for various types of work. The machine is equipped to handle a wide variety of different sizes and shapes and is said to wash all different types of metal such as steel, brass die castings, and so on. The Tripoli Remover unit can be arranged with a return type conveyor for use in straight line production, or to return the work to the original loading point.

The Tripoli Remover unit sizes range from a small semi-automatic unit for use in job shops and small plating departments up to large machines for use in connection with full automatic plating conveyors. Steam is recommended as the best heating medium but gas or electricity can be employed if desired.

Wayne Black Metal Wrap

A quick drying coating, used to protect chrome plated, lacquered and enameled parts as well as bare metal during handling, shipping, storage and export, to be known as "Black Metal Wrap", is now being marketed by Wayne Chemical Products Co., 9475 Copeland St., Detroit, Mich. Black Metal Wrap is a black liquid and can be applied by spraying, dipping or brushing on metal parts. It is said to dry very quickly into a tough film of shiny black color which protects the parts against rust, scratches, finger marks and the ordinary mars received during handling and shipping.

The manufacturer states that Black Metal Wrap can be easily removed by washing with common solvents including mineral spirits, gasoline, kerosene, and carbon tetrachloride. When a light film is desired, Black Metal Wrap may first be diluted with gasoline, naphtha or carbon tetrachloride.

Chrome Leather Finger Guard

A Chrome Leather Finger Guard which protects the thumb, fore and middle fingers against injuries in grinding, sorting operations, and so on has been just placed on the market by the Industrial Gloves Company, 722 Garfield Blvd., Danville, Illinois. The guard, as shown in the illustration is worn over the bare hand and is available in both right and left hand patterns.

The Chrome Leather Finger Guard is

Chrome Leather Finger Guard

thread sewed and has extra patches on the fingers and thumbs to afford maximum protection and service. The glove is held around the wrist by means of an adjustable string fastener. In addition to the design illustrated, the leather finger may be had without patches, steel reinforced, or steel sewed instead of thread sewed.

Willson Spectacle Type Goggles

A new type spectacle goggle, equipped with Super-Tough lenses and designated as Style WVI, has just been added to

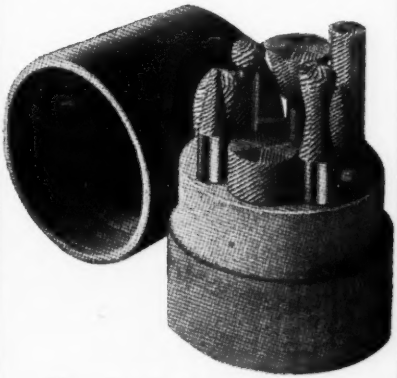
Willson Spectacle Type Goggles

the line of goggles now being manufactured by Willson Products, Inc., 271 Thorn St., Reading, Pennsylvania.

The Willson Style WVI is designed for maximum protection and comfort and is available in various assemblies to suit the individual requirements of the wearer and is particularly adaptable for use in industries where falling or flying objects present a serious eye hazard.

The illustration shows the goggle equipped with clear, wide-view lenses and rocker nose pads; it is also available with comfortable broad saddle nose bridge. The goggles are available with wire screen, leather or transparent sonite sideshields, and with Willsonite lenses when specified.

ROTARY FILES



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Munning "Improved Type" Tumbling Machine

The tumbling machine illustrated herewith has been designated as the "Improved Type" and is now being marketed by Munning & Munning, Inc., 202 Emmett St., Newark, New Jersey. This machine is available in single and multiple units with tubs of standard size for either belted or direct connected motor drive. The drums are made from high grade cypress, maple or oak panels, as desired, snugly fitted into cast aluminum heads with a friction cover which can be quickly fitted or detached.

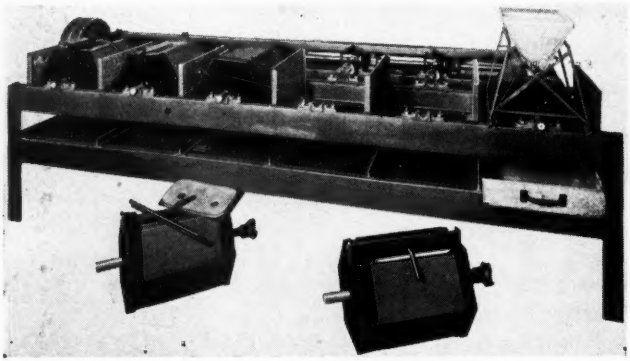
The frame of the machine is of all-welded construction and tubs are revolved through miter gears and a spiral jaw clutch which can easily be engaged or disengaged at will.

In the Munning "Improved Type" multiple units, each drum may be operated independently of the others and if occasion arises to remove a drum from the mechanism, it is simply necessary to lift it out of its bearings without dismantling any parts or disturbing the balance of the apparatus in motion.

Loading of the Munning "Improved Type" tumbling machine is accomplished through a hopper arrangement placed over the drums while in the stationary position, and in unloading, the barrel is simply inverted for discharge while the work empties into a double tray of the drawer type as shown in the illustration. The inner tray of this combination retains the finished work while the outer tray, which has a finer screen, retains the burnishing balls. The inner tray, being slightly shorter in length than the outer one, may be shaken back and forth for complete separation of the work from the balls before complete removal from the machine.

In wet tumbling, the liquid used during the operation can pass through a screened drain in the bottom of the machine.

The simplicity and versatility of this machine, due to the accessibility of all its parts, renders it highly effective for wet or dry tubbing articles of the following types: chains, tubes, cups, pins, studs, pens, optical goods, jewelry, safety razors, novelties, curtain rods, dental tools, surgical instruments, watch crowns, household fixtures, ring settings, eyeglass frames, purse frames, and so on.



Munning "Improved Type" Multiple Unit Tumbling Machine

DeVilbiss Type QM Hinged Lid Mixing Tank

The DeVilbiss Company, 300 Phillips Ave., Toledo, Ohio, has recently placed on the market a new hinged lid mixing tank, to be known as the Type "QM" designed to facilitate economical and efficient agitation or mixing of lacquer, synthetic enamel and other pigmented finishing materials. This tank is said to provide an inert atmosphere for the mixing of these materials, thereby preventing oxidation while handling.

The Type QM is available in 30, 60, and 120 gallon capacities. The tanks are plain, straight-sided shells inserted into a foot ring. The covers of the Type QM tanks are 5/16-inch flat steel stock, hinged across the tank with malleable cast iron hinges.

The clamps on the cover are said to render the hinged portion pressure bolted through a special solvent-resistant gasket into a steel channel welded to the tank lip to provide a gasket recess.

Hinged portion of the cover is of generous area to permit quick, easy filling of tank. A poring baffle protects the gasket from accumulation of paint and solvents while filling.

Safety has been emphasized in the design of the new mixing tanks. Leakage of explosive vapors into the mixing room

DeVilbiss Type QM Hinged Lid Mixing Tank

is prevented by the impervious one-piece gasket. Each tank is equipped with an explosion-proof motor, and clamped lid affords assurance against overrunning, with resultant loss and other hazards, in case of emergency.

The degree of agitation in the tanks is adequate for efficient mixture of heavy bodied pigment portions throughout the entire batch, and maintenance of a properly mixed material.

The Type QM tanks have been so designed that they may be interconnected in many different ways to form a battery for use in paint circulating systems. Larger tank sizes to meet particular requirements can be supplied on special order.

Staynew Filter Model CPH-L

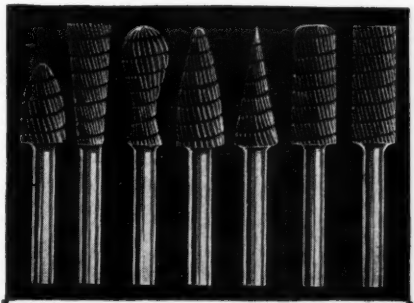
Staynew Filter Corp., 19 Leighton Ave., Rochester, N. Y., has introducted the Protectomotor Model CPH-L liquid filter for horizontal installations on liquid lines, where frequent inspections are necessary. Paint and oil are among the liquids filtered by the new unit.

Fundamental construction of the filter is the same as that incorporated in the rest of the line of Protectomotors. Container or shell is fabricated of seamless pressed steel with threaded intake connections in standard sizes. All other metal parts are of aluminum or other rust-resisting materials to suit the particular application. Drain cock is provided so that filter is easily cleaned by shutting off entering air and opening cock so that air pressure in the line backs up and blows foreign matter off filtering surface and out of cock.

Main features of the CPH-L model include reinforced core and spring retainer for lubrication lines on internal combustion machines. Filters are available with pipe sizes from ⅛ inch to 3 inches. A series of wire mesh-backed fins placed concentrically around a hollow core outlet is the principle upon which the filters work for pipe line use.

Mathews Light-Duty Overhead Trolley

A light-duty, all purpose anti-friction trolley suitable for use with endless chain power operated type trolley conveyers, or as individual trolleys manually operated has been placed on the market by Mathews Conveyer Company, Ellwood City, Pennsylvania. The outer shell of the trolley is made of ⅛ in. steel, case hardened. A ball bearing in-



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corporates a patented seal composed of a steel and felt labyrinth. The bearings are self-contained and are furnished grease packed or without lubrication.

The inner and outer ball races of the trolley are of solid steel, 3 point contact, and enclosed within a steel jacket. Conveyers with which the Mathews Light-Duty Overhead Trolley is used are made to convey unit loads overhead at the ceiling and descending to working heights at predetermined heights. Capacity of the Mathews trolley is 150 lbs. and it is suitable for handling an unlimited number of commodities through processing and manufacture.

Eclipse Gat

A new spray gun, to be known as the Eclipse "Gat", has been placed on the market by Eclipse Air Brush Company, Inc., 390 Park Ave., Newark, New Jersey. The Eclipse Gat embodies the power pressure operating principles as utilized in all Eclipse equipment.

The Eclipse Gat weighs 23 oz. complete and is manufactured from heat treated Dowmetal. The Eclipse Gat can be operated with either internal or external atomization.

Nozzles are available for practically all purposes and materials. The widths of spray vary from 1 in. to 36 in., depending upon the requirements. Heavy paint

Eclipse Gat

can be sprayed at low pressure and it is stated by the manufacturer that many materials hitherto considered out of the possibility of spray equipment have been successfully applied with the Gat. Excellent results have been obtained with nitro-cellulose and synthetic lacquers, as well as with paints, varnishes and enamels.

The Eclipse Gat is designed for exceedingly fast work and for perfect finishes under all conditions.

Industrial Wet Type Spray Booth

A wet type spray booth has recently been developed by Industrial Sheet Metal Works, Inc., 626 E. Forest Ave., Detroit, Michigan. The booth is said to utilize the principle of passing paint laden air at low velocity through a series of water spray curtains atomized under a hydrostatic head in specially designed nozzles. A feature of this booth is a flood sheet which is said to eliminate the necessity of cleaning the interior of the spray chamber.

The booth is equipped with eliminators which effectively remove moisture from exhausted air thus eliminating troublesome leaks in discharge duct work.

The booth is of heavy welded construction and available in a series of types and sizes suitable for use with continuous conveyors or stationary operation.

Lewis Roe Polishing Lathe

Lewis Roe Manufacturing Co., 1051 DeKalb Ave., Brooklyn, N. Y., has recently placed on the market a polishing lathe, to be known as the "No. 2". The No. 2 machine is Timken bearing equipped. It is also equipped with a brake

Lewis Roe Polishing Lathe

which is said to instantaneously stop the machine when running at 2,500 r.p.m. When the brake is locked, buffs or wheels can be tightened at either end of the spindle without the necessity of using a wrench on each end.

Alemite grease cups are provided for lubrication purposes. The ends of the shaft are threaded for taper points. The Timken taper roller bearings provide a means for take up for wear.

Sol Klean Rust and Grease Remover

A rust and grease remover to be known as "Sol Klean" has recently been placed on the market by Industrial Chemical Products Co., 3775 Bellevue Ave., Detroit, Michigan. Sol Klean is a patented material composed of phosphoric acid and solvents which is said to remove grease, dirt, and rust.

Sol Klean is available in two different types, a wash-off type and a wipe-off type. The wash-off material is available in concentrated form and diluted with two or three parts of water. It is brushed on and then rinsed off with hot water at an approximate temperature of 140 degrees. The wipe-off material is sold in concentrated form and can be diluted with two or three parts of water. It is brushed on and immediately wiped off. After sufficient time has been allowed for the surface to thoroughly dry, it is ready for painting.

Lapp Porcelain Pipe

An acid-resisting pipe which is made out of pure porcelain and is glazed inside and out is now being marketed by Lapp Insulator Co., Le Roy, N. Y. The porcelain is said to be non-porous and non-absorbent, so that a scratch or crack will not permit liquid to be absorbed or contaminated. The pipe is glossy white and is supplied with chromium-plated fittings.

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